

Railway Maintenance Engineer

Volume 17

CHICAGO—JANUARY, 1921—NEW YORK

Number 1

Rail Anti-Creepers

THE P. & M. CO.

THE P. & M. CO.
LIMITED
MONTREAL, CANADA

CHICAGO
NEW YORK

THE P. & M. CO.
(ENGLAND) LTD.
31, BUDGE ROW, LONDON.

Nowhere That P & M Service
Cannot Reach



International Steel Crossing Foundations

Why Is the Cost of Crossing Maintenance So High?

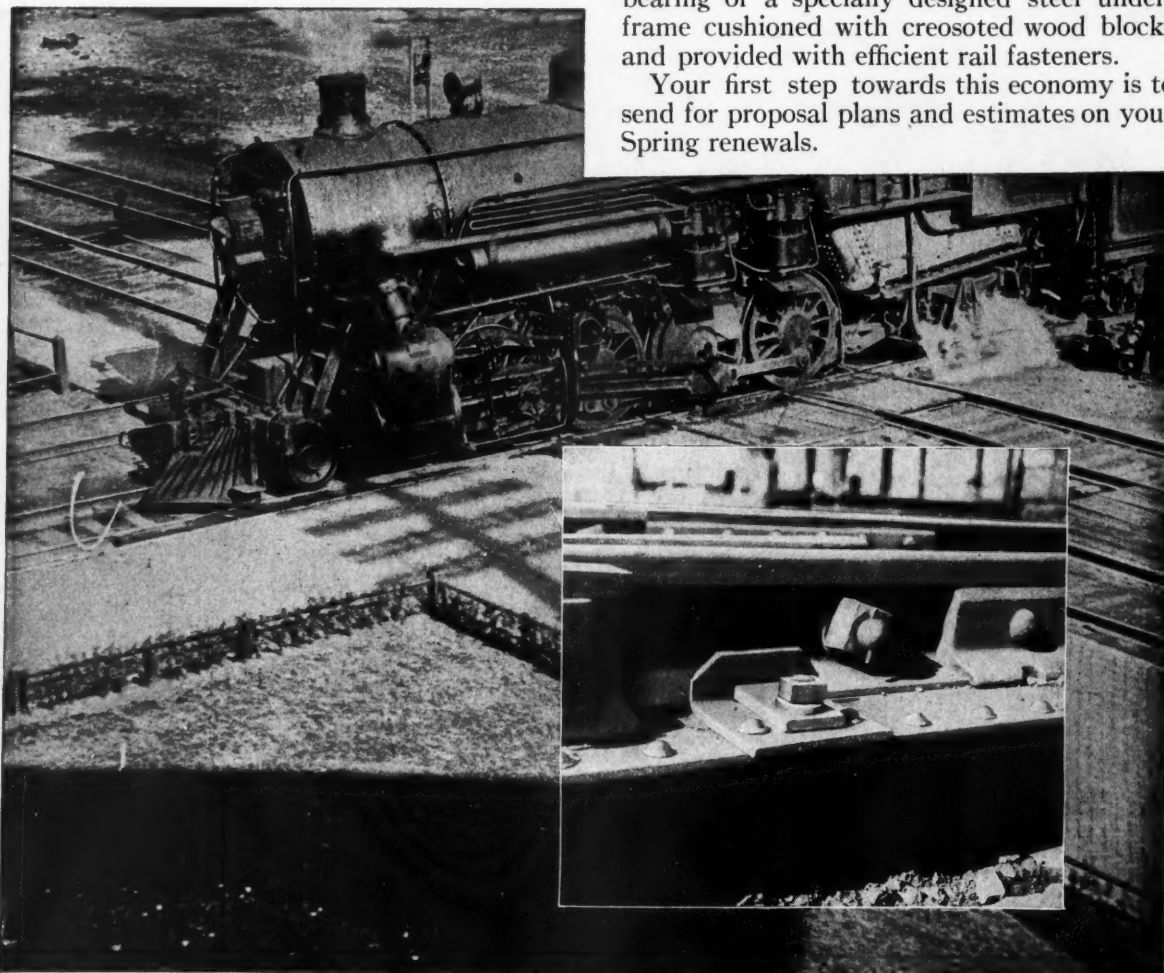
BECAUSE wooden ties cannot be arranged under crossings so as to distribute the loads into the ballast.

If they are located to carry one track, the other must go unsupported.

The rocking, twisting shocks of relentless wheel loads over worn flangeways loosen and break bolts and fillers; movement starts between the members of the crossing and rapid wear and deterioration result.

Users of Steel Crossing Foundations are cutting the high costs by providing a wide based unit bearing of a specially designed steel under-frame cushioned with creosoted wood blocks and provided with efficient rail fasteners.

Your first step towards this economy is to send for proposal plans and estimates on your Spring renewals.



The International Steel Tie Company

Manufacturers of Steel Twin Ties and Crossing Foundations

16704 Waterloo Road, Cleveland, Ohio

RAILWAY MAINTENANCE ENGINEER

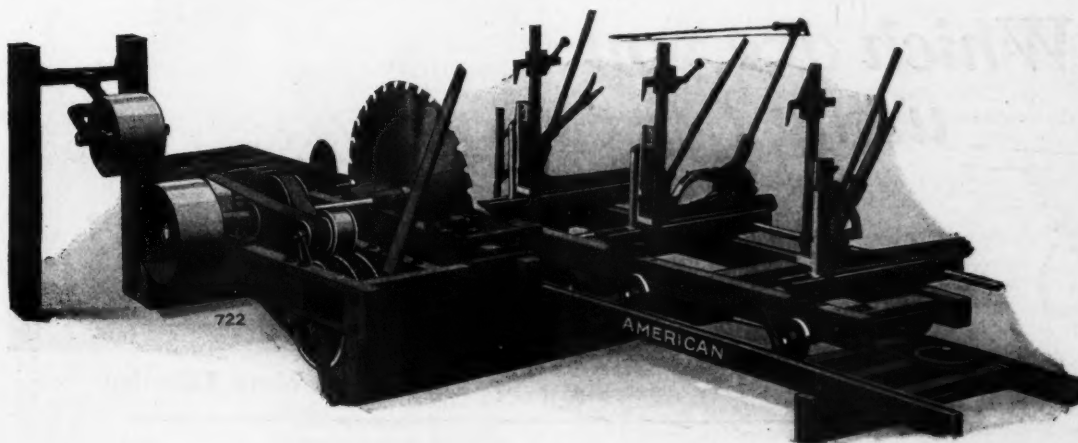
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ECONOMY

In Reclaiming Discarded Timbers

WHEN your Atlantic type locomotives became too light for main line service, what did you do? Turned them into locomotives fit for that service or put them at service for which they were suited.

Then why in the name of Economy don't you do the same thing with your discarded bridge and building timbers? Why don't you let an



American Portable Saw Mill

reclaim them for you, and make them fit for service? Think of it! Good lumber out of old timbers, good planking out of old bridge timber, good fuel out of old cross ties, good lumber obtained at the cost of resawing.

You see the point just as those others saw it—those others who now saw discarded timber into usable lumber, and are astonished at both the low cost of American resawing equipment and the decided saving it effects.

Remember what you did with your "Atlantics"—make them fit for service, and don't forget that that is exactly what an "American" will do for your discarded timber.

Write for facts on these Portable, Profitable American Saw Mills.

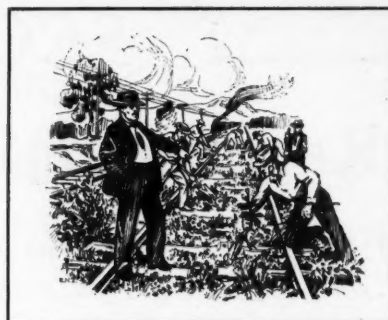
AMERICAN SAW MILL MACHINERY COMPANY
HACKETTSTOWN **NEW JERSEY**

Weeds Make Seeds
But Don't Make Gardeners of Your Laborers

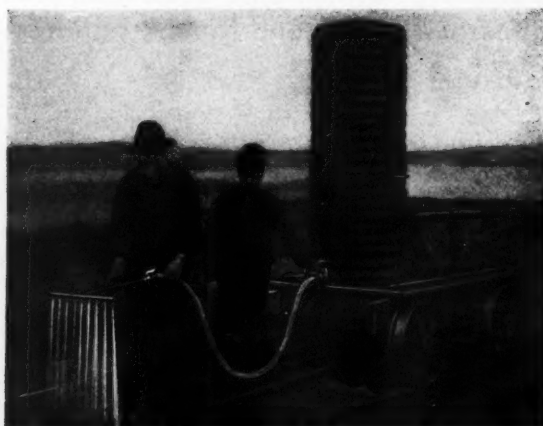
Three Ways Of Handling Track Vegetation

*Which are you
 using?*

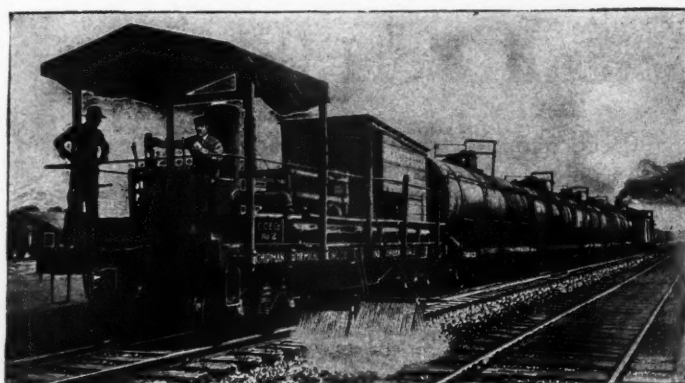
Write for illustrated booklet
 "How to Keep a Clean Track"



HAND WEEDING
 Laborious, Resultless, Expensive



Slow But More Effective



ATLAS "A" Weed Killing Service

Efficient, Economical Eradication—By The Atlas "A" Service
CHIPMAN CHEMICAL ENGINEERING COMPANY, INC.

95 Liberty Street,

New York



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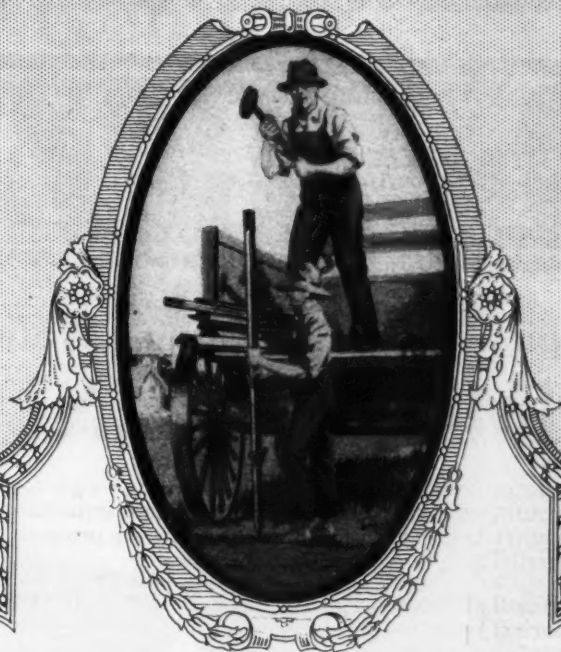
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The RED TOP Guarantee

WE guarantee RED TOP Steel Posts will not break, burn, rot or frost-heave in the fence line; that they are free from defects in material and workmanship; that they will outlast the heaviest fencing manufactured.

We guarantee RED TOP Posts to be just as represented in our literature and advertising.

Any RED TOP Post which does not fulfill the above guarantee will be replaced by your dealer—without cost or argument.

BROOKE ANDERSON, *Pres.*

CHICAGO STEEL POST CO.

Railway Representatives

Maintenance Equipment Co.

Railway Exchange Bldg., Chicago, Ill.

For booklet describing RED TOP Guaranteed Steel Fence Posts and their money saving features, address **Maintenance Equipment Co., Railway Exchange Bldg., Chicago, Ill.**

Red Top

GUARANTEED

Steel Fence Posts



The Original Elastic Membrane Waterproofing System MINIMIZES MAINTENANCE

Repairs on a defective sub-level waterproofing course in railway construction are more than difficult—they are, in the great majority of cases, impossible.

This fact emphasizes the superlative importance of enduring quality—permanence—in the waterproofing materials used. For waterproofing once laid is laid for all time—for good or ill, as its quality determines.

Can a price-difference of one cent—or even of many cents—per square foot of initial

cost, weigh for a moment against the vastly more important consideration of permanence in the protection afforded?

Experience of 14 years, including service on most of the leading railroads of the country, indicates that a Minwax Elastic Membrane Waterproofing System, once properly placed, is permanently in place and proof against depreciation. The Minwax record is a record free from any failures. So far as observations and experience can prove, you pay for Minwax only once.

Write for Bulletin 21

MINWAX COMPANY, Inc.

Manufacturers and Consulting Engineers on Waterproofing Problems

18 East 41st Street, New York

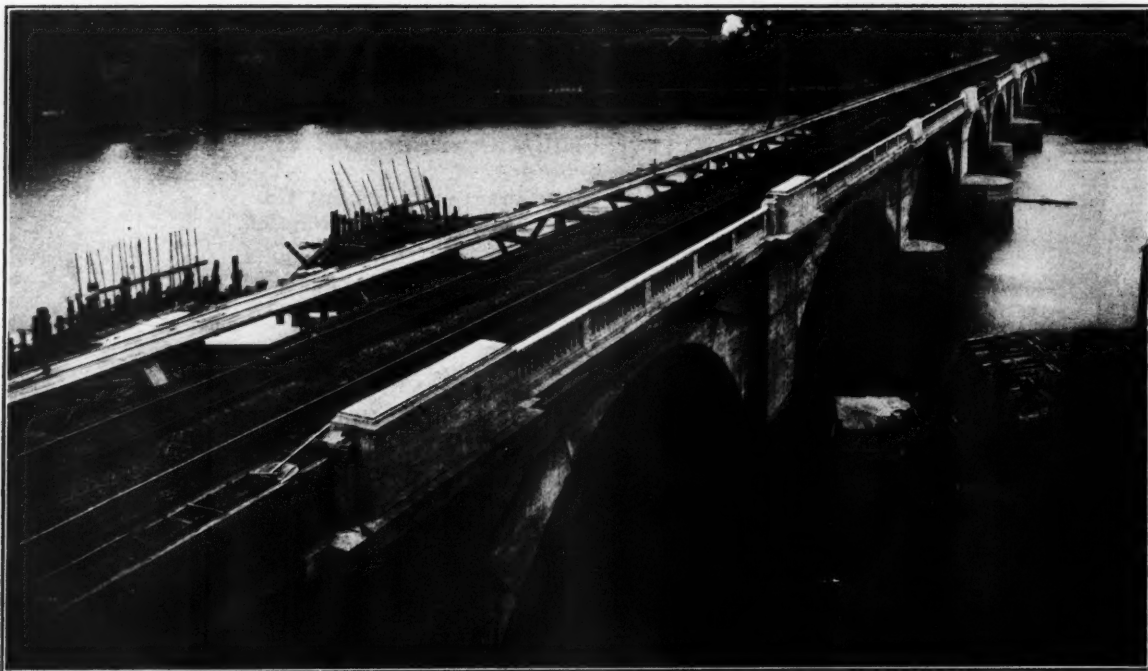
Chicago:

328 So. La Salle Street

Philadelphia:

507 Shubert Building

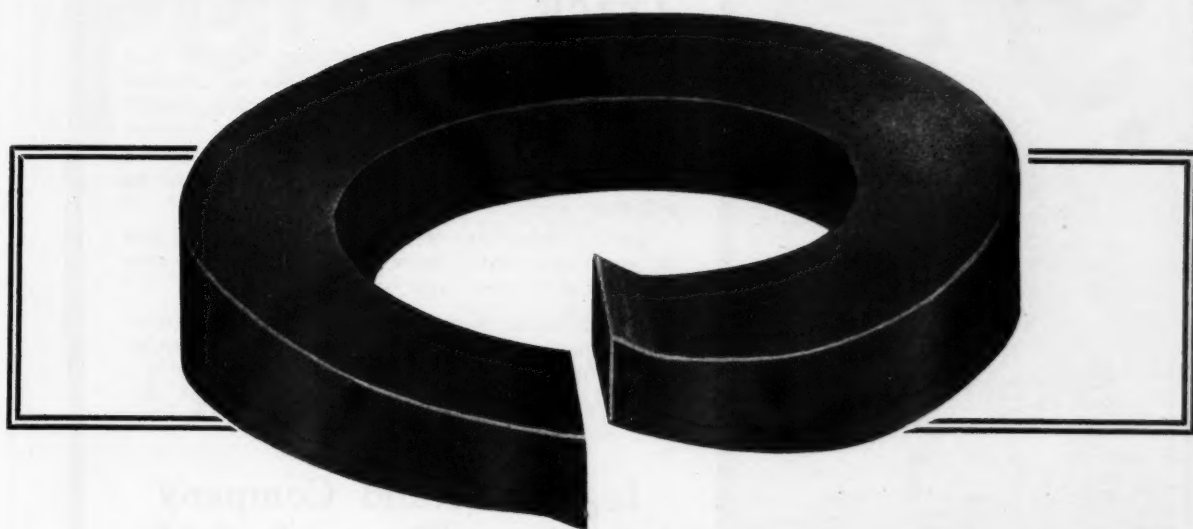
"The Proof of Quality is a Record of Service"



Columbia Bridge, P. & R. R. R., Philadelphia, Pa.—Waterproofed by the Minwax Elastic Membrane System.



Genuine POSITIVE



Lock Washer

Genuine means it's a Positive. *Positive* means what it says: a *Positive* "sticker" to the job upon which it is applied. Otherwise it could not deserve the name *Positive*. In addition to the Keystone shaped stock from which it is made, thus assuring a FULL BEARING SURFACE, note the barbs—the sharp heel which grips the nut. Track inspectors know the *Positive* Lock Washer and seldom hesitate for a second look.

Specify, buy and apply *Positive* Lock Washers. Then will you be able, *Positively*, to forget loose rail joints forever.

Also Manufacturers of Plain Type Lock Washers.

The Positive Lock Washer Company

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NEWARK, N. J.

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160 Beale Street
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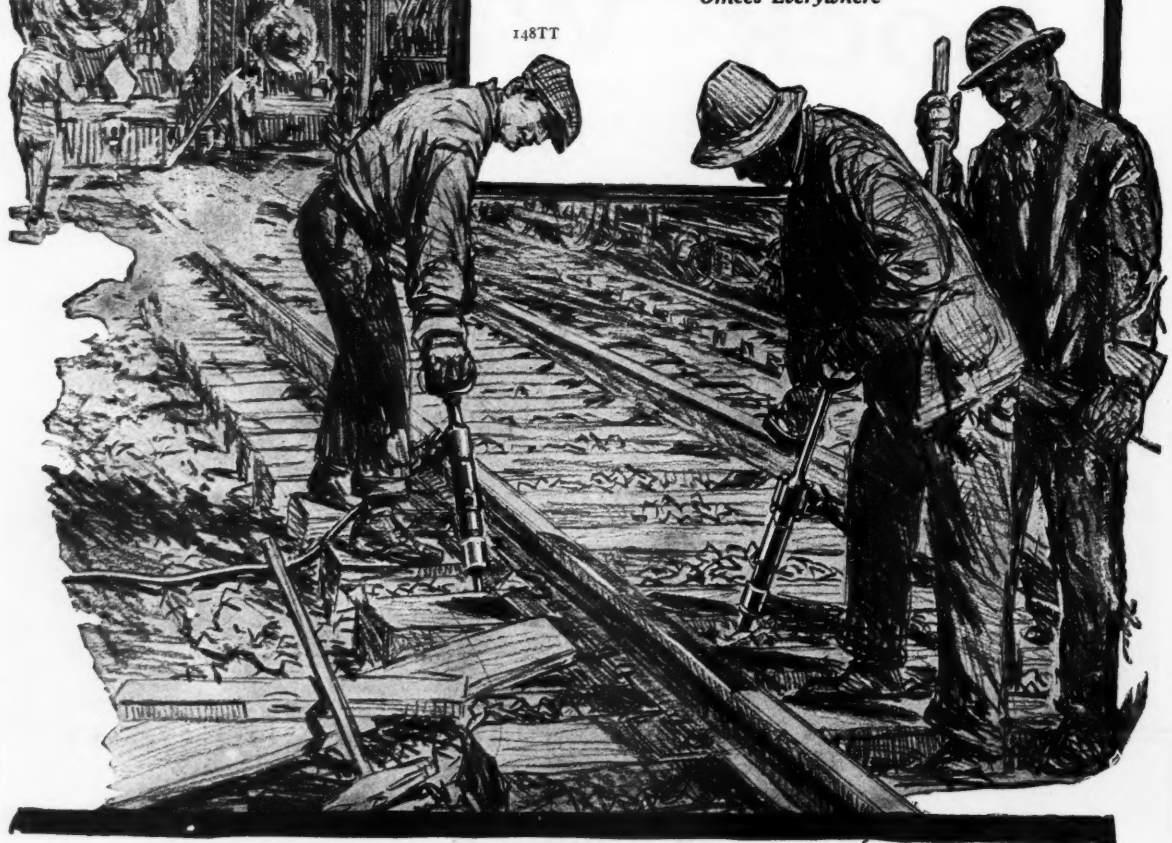
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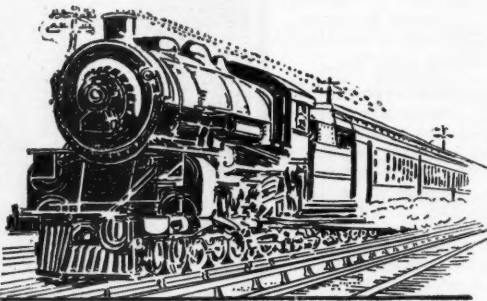
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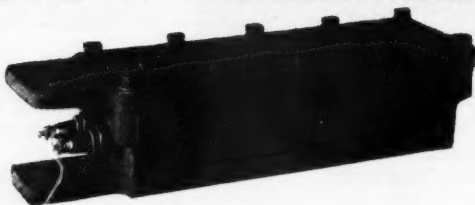
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5,000	8'	13' 6"	4,400
6,000	8'	16' 3 1/4"	5,000
7,000	8'	19'	5,700
8,000	8'	21' 4"	6,200
9,000	8'	24'	6,800
10,000	8'	26' 7 1/4"	7,300
11,000	8'	29' 4"	7,900
12,000	8'	31' 10 1/2"	8,500
13,000	8'	34' 8"	9,100
14,000	8'	37' 1"	9,700
15,000	8'	40'	10,400
16,000	8'	42' 6"	10,900
6,200	9'	13' 1 1/2"	5,000
9,300	9'	19' 5 1/2"	6,500
12,300	9'	25' 10"	8,100
15,300	9'	32' 23 1/4"	9,700
18,200	9'	38' 7 1/2"	11,300
7,700	10' 6"	11' 11"	5,800
11,500	10' 6"	17' 9"	7,400
15,200	10' 6"	23' 7"	9,100
19,200	10' 6"	29' 5"	10,800
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	Diam.	Length	
6,000	10' 6"	9' 5"	4,100
9,000	10' 6"	14'	5,200
10,600	10' 6"	16' 6"	5,600
12,000	10' 6"	18' 4 3/4"	6,300
15,000	10' 6"	22' 10"	7,000
15,500	10' 6"	23' 11"	7,300
16,300	10' 6"	25' 4"	8,000

Fitted with one 16" manhead with bolted or screw cover and three 2" flanges or equivalent for pipe connections. *Corrected Sizes and Dimensions.*

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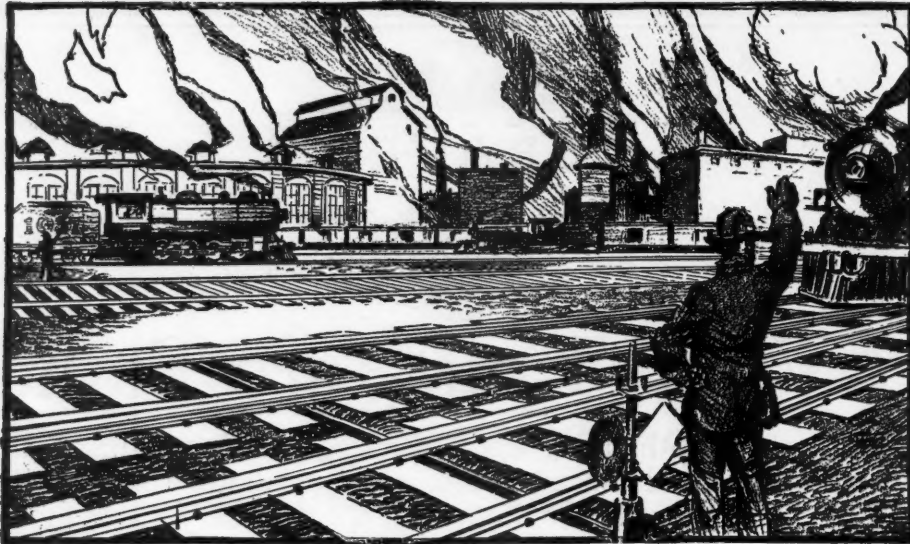
3/16 in. Metal Throughout.

Capacity Gallons	SIZE		Shipping Weight
	Diam.	Length	
550	4'	6'	800
1,000	5' 5"	6'	1,200
1,500	5' 5"	9'	1,600
2,000	5' 5"	12'	2,100
2,500	5' 5"	15'	2,600
3,000	5' 5"	18'	3,000

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Railway Maintenance Engineer

Vol. 17

January, 1921

Number 1

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During the first ten months of 1920, 3,476 head of stock were killed on less than 900 miles of a western road. The

One Waste Which Can be Eliminated

average cost of settling claims for this stock was \$35 per head. At this rate the payments exceeded \$12,000 per month for this line, or almost \$15 per month per mile of road. This expenditure added nothing to the value of the railway or to its service to its patrons. From the standpoint of the country as a whole the destruction of 350 head of stock per month was an economic waste. This loss was not peculiar to the road in question, but is prevalent on nearly every railway in the country. Its prevention lies largely in the hands of the maintenance of way department, particularly the section forces; frequent inspection and repair of fences, keeping gates closed and vigilance in detecting fraudulent claims, are measures contributing to the reduction of this expenditure. This is one way in which railway expenses can be reduced with benefit to all concerned.

The past three years have been fraught with many difficult problems for the maintenance of way department.

Get Ready for 1921

The wear and tear on the properties has been unusually severe, while the difficulties in securing adequate quantities of labor and materials have made proper renewals and repairs impossible. The favorable autumn in most parts of the country was of great assistance in getting the tracks

and structures into condition for the winter, but they are still below their normal pre-war standards of maintenance. This will require special diligence on the part of all employees throughout the country to detect promptly any signs of weakness or failure and to install proper protection. No stone should be left unturned in providing the maximum of safety. Furthermore, plans should be started immediately on preparations for next season's activity in order that as much as possible of the deferred maintenance still remaining may be overcome. To secure the best results will require careful planning, both for the development of a program of activity, for the selection of materials and for the organization of forces. Now is the time to begin for the old adage still applies that "the early bird catches the worm."

Not many weeks ago a supervisor, in talking to a maintenance officer of another road, expressed considerable

A Poor Method of Cleaning Stone Ballast

surprise that that road was making no attempt to clean its stone ballast. Questioning developed the fact that this supervisor's idea of cleaning ballast was to stir it up, thus allowing the fine coal dust and dirt to settle down through the stone. Further questioning has shown that quite a few other maintenance men share this misguided idea. It is hard to realize that a supervisor can believe that any beneficial results can be obtained from this method. It is true that the ballast looks clean, but it is simply a case of "beauty only skin deep," for the dirt has been placed

where its effect will be detrimental to the track and not merely unsightly. This incident only goes to prove that no matter how far or how fast we progress, there are times when it is necessary to return to an exposition of the fundamentals, lest they be lost sight of entirely.

THE LABOR SITUATION DEMANDS THOUGHT

FOR the first time since the beginning of government control labor is plentiful and, what is more to the point, it shows a greater tendency to render a full day's work. It is the irony of fate that in the face of this condition the railways, which not only have a mass of deferred maintenance work ahead of them, but are also confronted with an immense amount of work which must be done in 1921, are experiencing a severe decline in traffic and therefore in earnings and are, as a result, following the general industrial tendency and laying off large numbers of men in the maintenance department and elsewhere. It is extremely unfortunate that the railways are not able to utilize this opportunity to undertake the necessary rehabilitation of their properties, but their financial condition, brought about by the fact that they were returned to their owners without cash reserves and with the government in arrears to the extent of over \$400,000,000 in the payment of rentals, is such that they are at present in dire straits. While the Transportation Act places a premium on efficiency in maintenance and a penalty on drastic fluctuations in forces, it is to be hoped that the present situation will be of short duration and that maintenance of way officers will soon be enabled to reorganize their forces on a more permanent basis.

It has unfortunately been true that precedent rules strongly in railroading, even where this results, as is frequently the case, in increasing ultimate expenditures. Typical of past practices or habits are reductions in pay rolls for one or two months. Almost invariably such practices increase rather than decrease costs. The work is there and it must be done—if not now, then later. The longer it is put off the more it costs, and this is especially true where labor is the predominating factor.

It would seem a serious mistake if the railways should neglect the opportunity to put their maintenance forces on a modern, efficient basis during the next two or three months. This does not mean that they should maintain the large forces of the so-called working season, but it does mean that a permanent, compact and efficient organization should be built up and retained. The value of such an organization is undoubted. The advantage of winter maintenance work has been emphasized time and again and with some results. Each year maintenance officers are finding it possible to carry on certain work during the winter which it was thought could only be done during the customary working season. This, however, is only one of the advantages resulting from the creation of a permanent organization. There is the further advantage of being able to secure higher class men with a given rate of wages, with the result that the turnover is decreased and in the end all costs are greatly reduced.

Labor turnover has, in the past, hinged on five factors, restlessness or inherent wanderlust, insufficient wages, the drudgery of the work, intermittent employment and unsatisfactory housing and feeding facilities. Taking advantage of the present situation the first two factors can now be eliminated, for the "boomer" can be replaced by better men while present railway wages are on a par with or better than the general and somewhat unstable level of industrial wages. The introduction of

labor-saving equipment is a worth-while start towards the solution of the third, but there is still much which can and should be done along this line. This, then, makes future competition for labor rest on the basis of steady employment and adequate housing and feeding facilities. If keen competition again develops it does not appear probable that the railways will be able to compete for good labor on that basis unless there is a marked change in present methods and policies.

A REVIEW OF 1920

THE past year was a most unusual one for the railroads. The traffic handled during most months was by far the heaviest ever recorded. Congestion and car shortage were severe, demonstrating most forcibly the need for more equipment and an expansion of the fixed properties. Yet in the face of these conditions, construction was at the lowest ebb ever recorded, while the purchases of new equipment were abnormally small. These facts are developed fully in the article on page 21 reviewing the railway record of 1920.

The maintenance of way record for the past year was more favorable. Following the end of government control, a united effort was made by the railroads to restore their lines to their previously established standards of maintenance. Unfortunately, a large part of the maintenance of way season was coincident with a period of remarkable business expansion, a coal shortage and labor disturbances in the operating department of the railroads. So the roads were confronted with an inadequate supply of material, a labor shortage and traffic congestion. The greatest shortage of materials related to rail, of which only about 650,000 tons were available at the beginning of the season, either in stock or on orders placed by the United States Railroad Administration. This total, fortunately, was supplemented by orders placed with the mills by the corporate organizations of the railroads for delivery following the return to private management. Although no accurate information is available as to the tonnage of rails delivered to the roads during the year, this total was unquestionably so small that no appreciable reduction has been made in the large amount of deferred rail renewals.

The tie situation presented a more favorable aspect. In spite of the practical cessation of tie purchases during the months just preceding the end of government control and the consequent scramble for such ties as were available following the return to private management, the roads were able to secure a fair quantity of ties. The marked change which has taken place in industrial and commercial conditions during the last two months, and particularly in the lumber industry, has placed the buyer and seller on a new relationship, so that the roads enter the new year with an unusually favorable tie market.

No phase of maintenance of way activities is of greater interest or of more importance than that concerning labor, and the history of the past year is no exception in this regard. It was a period of sharp contrasts. During the past 12 months maintenance officers have seen both the greatest labor shortage and a marked labor surplus. They have seen labor most independent in one month and most tractable in another. The past year witnessed the greatest expansion of the maintenance of way brotherhood, culminating in a strike order in February, but there is no question that the year closed with the relations between the employees and officers on a more favorable basis than for a number of years past. In view of the definite progress which was made in the restoration of maintenance conditions during 1920, and with the present outlook as to the supply of labor and

material, the opportunity for real progress in the restoration of the roads to the old standards is most favorable.

GET RID OF THE INTERPRETER

THE interpreter in a labor gang was once a necessary evil; for a long time his services were of questionable value, but at present there can be little excuse for submitting to his presence. The term interpreter as applied to railway maintenance work is but a polite synonym for padrone, an individual who foists his services on the employers of certain classes of foreign-born labor by virtue of the power he exercises over the group of men under his control. In the past, when this country harbored a large number of foreigners who had been here but a short time and who in consequence knew nothing of our language and less of our customs and methods of work, an interpreter was necessary, no matter how bad his influence on the men might have been. But this condition no longer exists. For a long time immigration has been practically suspended in this country and the great bulk of the men of foreign birth who are now within our borders have had not less than four years in which to become acquainted with American customs and to learn something of our language. As a consequence most of them should have no trouble in working in any gang. Moreover, there are now in the employ of the railways in many parts of this country men of foreign birth who have become valuable, wide-awake workmen, subforemen and foremen and who can be depended upon to instruct and supervise the work of those new arrivals of their own race who have come to this country recently.

The interpreter, in the sense that he is known by American maintenance of way men, is a parasite. He represents a system that has no place in American institutions. His presence in the gang is a source of annoyance, if not open obstruction, for he has no interest in the work except as it enables him to receive an assistant foreman's salary for a minimum of effort and to exact tribute from the men. For the good of the men he exploits, for considerations of economy and for the advancement of Americanization, the interpreter should be eliminated, and the present period of labor surplus offers the best possible opportunity to make this a reality. At present, when men can be had for the asking, the railroads should have no difficulty in putting the ban into effect individually, but it would be well for them to take steps for a united front, since otherwise discrimination against those roads which take action in this cause will result.

LETTERS TO THE EDITOR

A WIND SHIELD FOR MOTOR CARS

Salt Lake City, Utah.

TO THE EDITOR:

Because motor cars are not ordinarily provided with shields to protect them from the wind in winter, section gangs suffer severely from the cold when riding over their sections on motor cars. This condition has brought forth various experiments to obtain relief, among which the following is one which has met with considerable success:

Take two pieces of wood about one inch thick, two inches wide and three feet long and nail one piece on each side of the front of the motor car. Then stretch a strip of canvas between these two upright posts and nail on each side. This forms a very efficient and economical wind shield.

V. L. BELL.

A Task for Every Employee

On March 1 of last year when the railways were returned to their owners by the government, many of them had hardly a dollar of working capital in their treasuries. They had to earn the money to meet their first payroll. A short time later their payrolls were increased \$650,000,000 annually retroactive to last May. To offset this an increase in rates was authorized effective September 1, but all of this is not yet in effect. More recently the roads have experienced a sudden and severe slump in traffic and in earnings. With the government owing them over \$400,000,000 in rentals, with a considerable part of the increase in rates still inoperative, and confronted with the impossibility of reducing expenses as rapidly as earnings are declining, the railways are facing a financial problem of tremendous proportions which will tax their resources.

The success of a railway lies in the efficiency of its organization. Those roads will emerge from the present critical situation best whose employees from president to laborer unite in an intensive drive for efficiency, eliminating waste, giving a full day's work for a full day's pay, and saving money for the company wherever possible. No one desires to work for a road which is not prosperous. The railways can only pass through the present acute financial difficulties into the days of greater prosperity ahead if every employee contributes the maximum of his ability to the success of the organization.

and maintenance of way officers are those on the corrosion of iron and steel, cement, reinforced concrete, standard specifications for concrete and reinforced concrete, concrete and concrete aggregates and preservative coatings for structural materials. Among the tentative standards are those for steel tie plates, low carbon steel track bolts and bronze bearing metals for turntables and movable railroad bridges. This volume also contains the tentative revisions of A. S. T. M. standards for open-hearth, steel girder and high speed rails, quenched carbon steel track bolts, quenched alloy steel track bolts, steel screw spikes, structural steel for bridges and structural nickel steel. The second volume contains the technical papers which were presented at this meeting, including one on the shattered zones for steel rails with notes on the interior origin of transverse fissures by J. E. Howard and another on the effect of hydrated lime and other powdered admixtures in concrete by D. A. Abrams, Lewis Institute, Chicago.

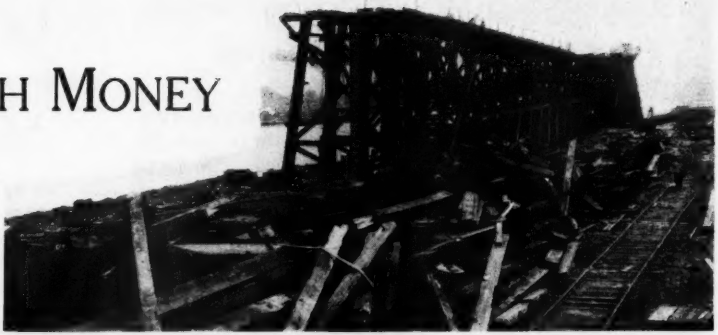
NEW BOOKS

Proceedings of the American Society for Testing Materials for 1920. Two volumes, 6 in. by 9 in., 1350 pages. Bound in cloth. Published by the American Society for Testing Materials, 1315 Spruce street, Philadelphia, Pa.

The first volume contains the reports of committees and the tentative standards submitted to this meeting. Among the reports of special interest to railway engineering

RESAWING TIMBER SAVES MUCH MONEY

Lehigh Valley Effects Large Economy
by Reclaiming Material Taken
from Retired Coal Dock



The Dock and the Material Taken from It.

THE LEHIGH VALLEY is now supplying its construction department with nearly a million and one-half feet (b. m.) of lumber at a large saving over the cost of new material through the salvage of the structural timber from an old coal trestle at Buffalo, N. Y. This material is being delivered to the various construction projects now in progress, cut to the sizes and lengths required, direct from the site of the old structure where a portable saw mill has been set up to work over the reclaimed lumber. Although the old dock was retired because it was in a deteriorated condition that rendered it useless, it has been possible to salvage 80 per cent of the material it contained, estimated at 1,900,000 ft. b. m. Except for a small portion of this, used or sold as locomotive kindling, the material is being reused for structural purposes and a large part of it is being put to immediate use in bridges, docks and similar structures which are being built at various places on the railway. The remaining lumber is being placed in storage for later use by the construction or maintenance of way department.

The dock in question was located on railway terminal property of the Lehigh Valley in the western part of Buffalo, known as Tifft farm, where it served for 30 years subsequent to its construction in 1887 as a dock for the transfer of coal from cars to lake steamers. Built originally of white pine, the structure gave 18 years of service life before it was necessary to renew it with yellow pine, although some of the original white pine still remained in certain parts of the dock at the time it was dismantled. In 1915 the physical condition of the structure was such as to point to the necessity for its early retirement and as a consequence a modern structural steel coal dumper was constructed on a site immediately to the west, since which time the old dock has been maintained solely for emergency use. However, in the last two or three years the increasing cost of maintenance, coupled with the fire hazard involved in the presence of this large unused structure, led to the decision to dismantle it.

The question naturally arises as to the possibility of saving 80 per cent of all the material in a structure which was in such a deteriorated condition that it had to be retired. The answer to this is that the principal seat of decay was in the wharf on which the coal trestle was supported. This wharf, which was badly decayed, was not dismantled with the trestle, so the timber it contains is not a factor in the reclamation work. Moreover, such deterioration as did occur in the trestle proper was essentially localized, as, for instance, to certain spots on the main posts at the level of the coal pocket linings.

HOW THE TRESTLE WAS WRECKED

Owing to the desire to eliminate the fire hazard in the immediate vicinity of the chute of the new coal dumper as quickly as possible, it was suggested that the dismantling of the coal dock be started at that point; but this would have involved the removal of the lumber in piecemeal fashion, entailing much greater expense than to begin at the point where the approach trestle crossed over the old return track ("A" on the yard map). Here the presence of a small plate girder span effected an interruption in the continuity of the wooden framing and permitted the release of the first bent with little difficulty.

Two locomotive cranes were used almost continuously during the entire time that the work was in progress, both in the actual wrecking and in piling the material and transferring it to the portable saw mill. In wrecking, the cranes occupied the old empty return track which in some places was shifted to put it as close to the old dock as possible. One of these cranes was a 25-ton, double-truck machine with a 40-ft. boom. The other was a single-truck, 10-ton crane.

The first step in dismantling was to take off the track rails and drop them over the side. The steel girders of the overcrossing were then taken down by the 25-ton crane. Following this, the footwalks, hand rails, ties and other portions of the decking were released and dropped over the side, to be gathered up for engine wood. The stringers were removed next in order. These had been packed in chords with staggered joints, making them continuous so they were sawed apart in units of two or three panels each and after the driftbolts were pulled, they were lowered by a locomotive crane.

Each bent was taken down whole. After releasing it from the longitudinal cross bracing and girts, it was tipped forward, away from the remaining portion of the trestle, taking care to snub it back to keep it from falling as it was pulled over. The

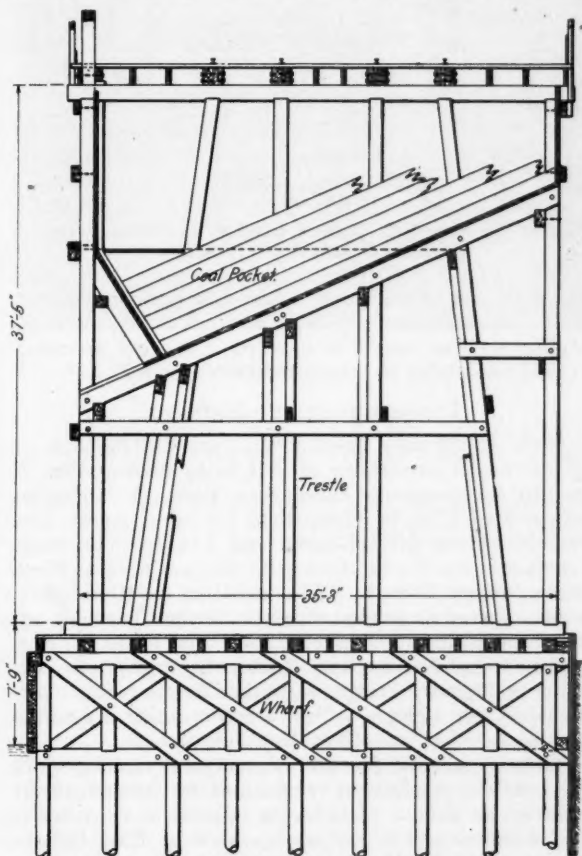


Piles of Resawed Lumber as Good as New. The Saw Mill in the Left Background.

wrecking of the coal pockets was a much more difficult job. The three-inch planks composing the sides and bottoms had to be pried off with bars, after which they were assembled in bundles to be lifted out by one of the cranes. The material removed from the trestle was either piled on one side or the other of the track used for wrecking or it was loaded on flat cars and taken directly to the saw mill, depending upon the sawing schedule being followed.

REASONS FOR THE RESAWING

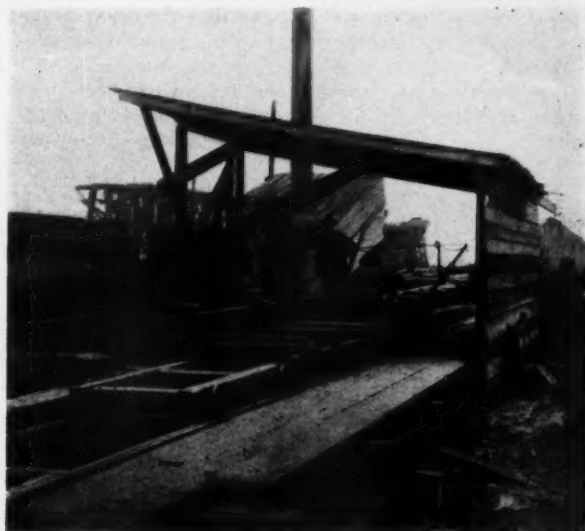
The material salvaged from the old dock consisted primarily of 12 in. by 12 in., 10 in. by 10 in., 8 in. by 10 in.,



Cross Section of the Coal Dock. Only the Portion Above the Wharf Deck was Salvaged.

6 in. by 8 in., 4 in. by 8 in., 3 in. by 8 in., 3 in. by 6 in., and 2 in. by 4 in. timbers. In so far as possible the material removed was reused in its original dimensions, but extensive resawing was necessary to remove decayed, cracked, broken or other defective portions from the tim-

bers and to provide timbers in sizes different from those released from the old dock. To fulfill the first object many of the pieces had to be slabbled on one or more



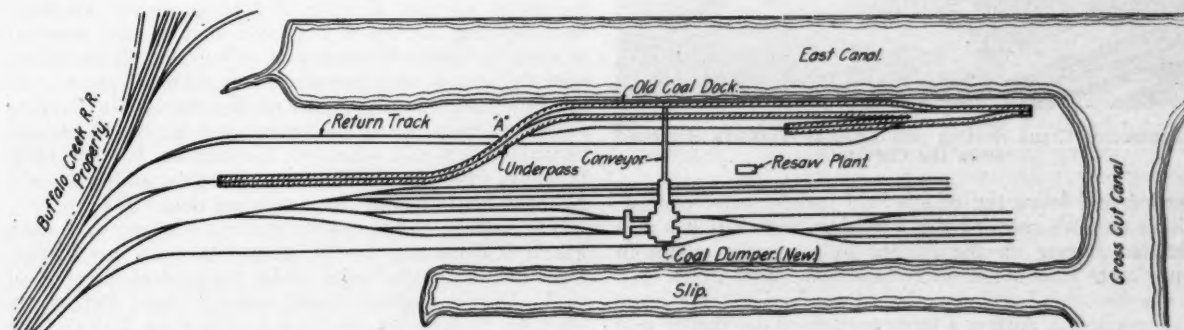
The Saw Mill Showing the Carriage for the Rip Saw in the Foreground.

sides to a thickness of one inch or more to produce sound, full-sized sticks. To accomplish the second object, some of the material had to be further sawed to reduce it to the sizes desired. In general the timbers were also cut off to even stock lengths.

The layout of the saw mill exerted a vital influence on the efficient conduct of the work. The plant, which was a portable outfit manufactured by the American Saw Mill Machinery Company of Hackettstown, N. J., consisted of a 48-in. rip saw equipped with carriage and a 36-in. cut-off saw, all operated by a steam engine plant comprising a single-cylinder engine mounted on the top of a small horizontal boiler. Waste wood, primarily the short ends removed by the cut-off saw, were used exclusively for fuel, so the power charge against the resaw plant was small.

This portable saw plant was not purchased new for this piece of work, but had been used previously by the Lehigh Valley on work of a similar character. One project of passing interest was its use in cutting timber on a small tract of woodland owned by the railroad.

As indicated on the small sketch, the plant is located between two tracks, making the receipt and forwarding of lumber most convenient. The rough lumber is delivered to the plant on a flat car propelled by one of the locomotive cranes, which unloads the lumber and piles



General Layout of the Coal Dock Development. The Old Dock Which Was Removed Is Indicated by the Cross-Hatching.

it in the rough lumber pile. Here two men look for and remove all bolts, spikes or other pieces of metal imbedded in the timbers which they deliver in turn to the sawyer. This sawyer and his helper handle the timber for all work done on it by the rip saw and then deliver it to the second sawyer and helper operating the cut-off saw, who in turn deliver the finished pieces to the stock piles.

The operation of sawing and wrecking has been governed very largely by the disposition of the material reclaimed. Owing to urgent demands for large quantities



The Rough Lumber Pile with the Saw Mill in the Background. The Workman Is Pulling Spikes.

of material on requisitions before it is available, nearly all the sawing is being done on orders for specific items, on many of which there is an urgent demand. As a result the sawing program is arranged to supply materials promptly on the most urgent orders, sawing up such timbers as will supply the required sizes with the least waste. This has complicated the delivery of timbers to the saw plant. The crane men have to pick out the sticks

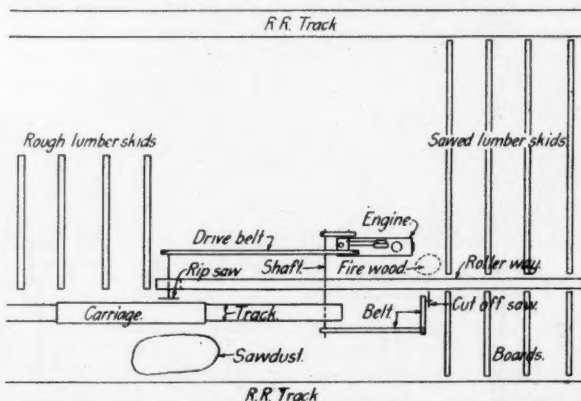


Locomotive Crane Sorting and Loading Timbers Removed from the Old Dock.

needed and leave the others in a rather scattered condition on both sides of the wrecking track. It has also entailed cutting up the lumber to a greater extent in some cases than is necessary to obtain sound wood.

On the other hand, this plan of conducting the salvage has resulted in putting a large portion of the timber into immediate use, thereby obviating the purchase of new

lumber and saving the charge for carrying the old material in stock for a storage period. Moreover, it enables the railroad to realize one of the prime advantages of a portable saw plant, since the timber prepared for



Plan of the Saw Mill. Sawed Lumber was Loaded Out in Cars Set on Either Track.

use on the site of the old structure may be shipped direct to the point of reuse without any rehandling or backhauling such as would be entailed if it were necessary to send the lumber to some permanent saw mill.

DISPOSITION OF THE MATERIAL

Some of the uses made of the reclaimed lumber are of interest. Considerable of it is being used at Pier 97 at East Forty-seventh street, New York. This consists primarily of 12-in. by 12-in. sticks for sub-stringers, 4-in. by 8-in. planks for sub-floors and 3-in. by 6-in. plank (surfaced) for the top floor. At the coal dock at Perth Amboy rough 12-in. by 12-in. and 3-in. by 10-in. pieces are being used as general repairs. At the Clairmont terminal quantities of 12-in. by 12-in., 6-in. by 12-in., 3-in. by 10-in. and 2-in. by 6-in. stock is being utilized. Repairs on highway bridges over the Morris canal, maintained by the Lehigh Valley, are consuming a quantity of 8-in. by 10-in. and 10-in. by 10-in. timbers.

Material suitable for use as structural timber, which has not been applied on requisitions for immediate application on various parts of the railroad, is delivered to the maintenance of way storage yard at East Buffalo. Here a considerable quantity, principally planking, is being finished in the bridge and building wood working shop. This work consists primarily of planing and dressing to work the lumber into "D & M" flooring, etc.

No complete cost analysis is available at this time to show the charge to be applied against all material reclaimed. An approximate estimate made during the course of the work indicates a cost very close to \$25 per 1,000 ft. b. m. of material actually reclaimed, including the small amount of material sold as engine kindling. In comparing the above cost with that of new material it must be borne in mind that practically all reclaimed material was a very dense growth all-heart stock. At the time that the larger part of this material was being reclaimed, new 12-in. by 12-in. or 8-in. by 16-in. and similar sizes would have cost the railroad \$60 per 1,000 ft. b. m., while smaller sizes of equivalent all-heart could not have been obtained for much less than \$100.

The salvage of the lumber in the Tift farm coal dock has been conducted by the maintenance of way department of the Lehigh Valley under the general direction of G. L. Moore, engineer maintenance of way, Bethlehem, Pa.; L. P. Rossiter, division engineer at Buffalo, has been in direct charge.



A Small Part of the Excavating Equipment Used at the Slide.

NINE STEAM SHOVELS REMOVE GREAT SLIDE

Large Plant Used by the Pennsylvania to Clear 130,000 Cu. Yd. of Earth
From Eight Important Tracks in Its Pittsburgh Terminal

DURING THE MONTH of November the Pennsylvania System conducted one of the most concentrated steam shovel operations ever carried on in the history of modern engineering. Nine steam shovels, two ditchers, 14 locomotives and over 900 cars were used day and night to remove a mass of earth aggregating 130,000 cu. yd. in volume and measuring 310 ft. wide, 200 ft. long and 65 ft. high. The reason for such Herculean efforts to remove this material was the fact that it lay across eight terminal tracks of the railroad in the city of Pittsburgh, about one mile east of the Union station, as the result of a most spectacular slide and retaining wall failure. A study of the physical conditions at the site of this slide has disclosed an interesting chain of circumstances extending over a period of 22 years which finally led to this expensive obstruction of the Pennsylvania's tracks. But even more noteworthy than the causes of the slide is the manner in which the maintenance of way officers of the railroad organized forces and equipment to overcome the obstruction and clear the tracks.

HISTORY OF THE SLIDE

The tracks of the Pennsylvania for some distance east of the station at Pittsburgh lie at the base of a high bluff of rock, shale and clay and at the point where the slide occurred the cliff was scored by a gully of somewhat flatter slope than the face of bluff. When, in 1898, the city undertook to build a public highway, later known as Bigelow boulevard, on a shelf in the bluff, some 200 ft. above the tracks, this hollow introduced a serious obstacle. Although the roadway was placed as near the natural contours at the head of the ravine as possible, it was found that a 60-ft. embankment was necessary. At first, it was decided to build a retaining wall along the edge of the highway for the support of this fill; in fact,

a portion of such a wall was built and the rock surface was cleaned off, preparatory to the construction of the remaining portions. However, this plan was abandoned and instead the embankment was allowed to take its natural slope, with the consequence that considerable of this material spilled out onto the railway tracks. This led the railroad to secure a restraining order, preventing any further work until proper measures were taken to hold the embankment.

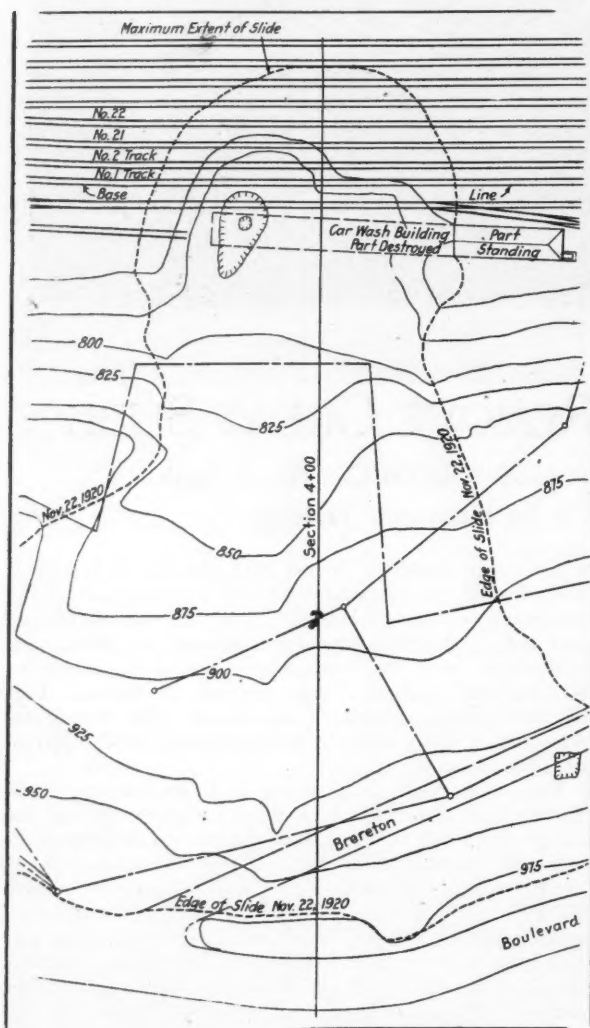
Following this, it was found that, by building a retaining wall about 200 ft. long at a narrow part of the gully about 125 ft. back from the nearest railway track and with its top about 90 ft. above rail level, support could be had for a fill sloping upward and back some 400 ft. to the roadway. This wall was of ashlar masonry of a maximum height of 55 ft. above its footing and was built in three different sections, giving it a peculiar shape. The wall developed difficulties very shortly after the back filling was applied, cracks appearing in the two wings. So the work was stopped and weep holes drilled through the bottom and a French drain placed at the back, after which the filling was again continued. As an additional precaution, a heavy timber crib was built some distance up the slope. After the work had been carried out in this manner engineers of the railroad made observations on the wall for a year subsequent to its construction, but no additional movement was noticed.

There are a number of springs in this ravine and, at the time that the highway was built, provision was made for them by the construction of several drains. The presence of these springs was again noted recently when test holes were drilled on the site of the boulevard and indicates one reason for the large amount of water in the earth fill.

From the time that this wall and highway were con-

structed until the present, filling operations were continued almost incessantly. The inhabitants of the neighborhood used this hollow as a dumping ground, while various contractors used it as a spoil bank for excavations. During the present year this filling was prosecuted with increased vigor, for the purpose of widening the highway embankment to improve the alinement. This work and improvements carried on elsewhere resulted in the deposit of about 30,000 cu. yd. of additional surcharge on the old retaining wall. About October 8, 1920, information was received by the railroad officers to the effect that cracks were developing in the fill along-

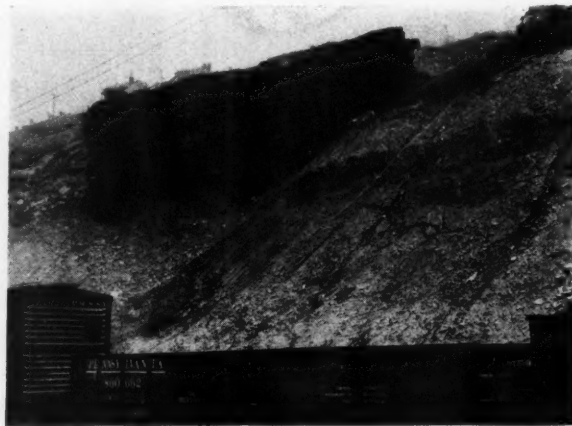
placing a force of men on top of the wall in an effort to remove as much of the load behind it by throwing the earth in front of the wall and thus adding weight at that point for additional support. Notwithstanding this, the wall kept moving forward, with a corresponding settlement of the ground behind it. This movement of the



Contour Map of the Site of the Slide.

side the boulevard, indicating a possible slip of the entire mass. Efforts were made to get in touch with the city authorities at once, but because of unavoidable circumstances a conference between the railroad and city officers was not held until October 18. In the meantime, the mass of filling had started to slide and considerable quantities of earth slipped down to the retaining wall and flowed over the top of it. About the same time the cracks, which had originally developed in this wall, showed indications of opening up again and in a short time they evidenced a movement of one inch per day.

Efforts were made at once to relieve the situation by



The Retaining Wall About an Hour Before It Fell.

wall was directly forward, without any tendency toward tipping, until the entire wall was carried far enough to move it entirely off its original foundation. Overturning then followed.

These conditions had not progressed very far before it became apparent to the railway officers that serious consequences were to follow. Unfortunately, a two-story brick building, 60 ft. wide and 290 ft. long, used for the service and stores of the coach cleaning and repair forces, stood directly in the path of the moving retaining wall, while the two main passenger tracks were located just beyond this building. When it became apparent that the wall would fall, arrangements were made for detour of passenger trains as soon as this should become necessary. The railroad also placed 150 men in the storage building to remove some \$150,000 worth of materials stored therein, and on the morning of October 29 this force had cleaned out the contents of the building with the exception of a small amount of stores in the basement.

An inspection of the conditions at 9 a. m. on that day indicated an early failure of the retaining wall. These conditions became so alarming by 10:30 a. m. that the men engaged in removing the slide from the retaining wall were ordered to abandon the work. This precaution proved well founded, for about 11:15 a. m. the wall began to disintegrate. All employees were warned out of the building and reached the point of safety before the wall finally failed at 11:45. It fell over in sections, the first part dropping out of the east end, the west end falling next, and the center portion going last. The falling masonry caused serious damage to the west end of the stores building, knocking in about 30 ft. of the rear wall and pushing out about 20 ft. of the front wall. About 80 ft. of the building was pushed 6 in. off the foundation and seriously racked. The fall of the upper portion of the wall and the wrecking of the west portion of the storage building resulted in fouling the No. 1 passenger track, but service was resumed as soon as debris was cleaned away. However, because of danger that further disturbances would result in the wrecking of other portions of the stores building and cause it to

fall on the track, a section 80 ft. in length was pulled down with the aid of a bridge derrick.

The portions of the wall to fall comprised essentially the top 30 ft., leaving the lower portion, 25 to 30 ft. in height, still in place, but this portion gradually tipped over until it reached an angle of about 45 deg. and was pushed forward by the great mass of earth behind it in approximately this position. Anticipating that a large mass of earth would soon flow out over the tracks and require extensive excavation operations, it was seen that the presence of the large masses of stone masonry of the retaining wall would introduce a serious obstacle. Consequently steps were taken as quickly as possible to dynamite this masonry, and efforts in this direction were well along before the flow of earth covered up considerable of this work.

The retarding influence of the presence of the retaining wall was exerted until November 2, after which the movement of the earth became more rapid, averaging about one inch per hour, and by November 4 the nose of the slide had reached the main line passenger tracks, putting them out of commission.

HOW THE SLIDE WAS REMOVED

When it became apparent to the officers of the Pennsylvania that a slide would take place, arrangements were made to muster a large amount of excavating equipment and organize an extensive force to remove the obstruction from the tracks as quickly as possible. As a consequence, two steam shovels were on the ground before the retaining wall failed and were thus able to start work as soon as the earth began to flow over the tracks. Other steam shovels were obtained from more remote portions of the Pennsylvania System and from contractors as quickly as possible and were cut into the work as fast as they arrived. At first an attempt was made to operate two steam shovels facing toward each other at the toe of the slide and load cars in a train on a through track immediately adjacent and directly in front of the slide, but it became apparent very soon that this method of operation could not be continued. The slide advanced so rapidly as to envelop the track in front of it, but even greater difficulty was experienced because the ground in front of the slide was pushed upward and outward, destroying the track. This action has been explained as resulting from the fact that a large mass of the retaining wall fell into the basement of the storage building and was then shoved forward by the weight of the material behind it, producing an action similar to that of a plow. This disturbance of the roadbed also served

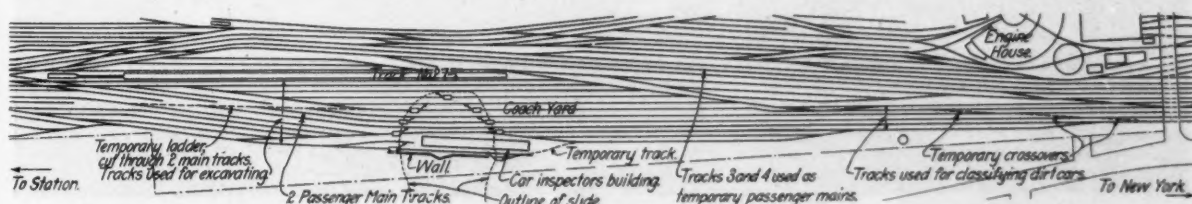
as long as the slide was actually moving forward. In fact, it was necessary to withdraw each of the shovels seven or eight times a day to prevent them from becoming enveloped by the slide. The track layout also shows how each shovel was placed somewhat in advance of the one next behind it. The inner shovels thus tended to protect the outer shovels from becoming blocked in the slide while the outer shovel was digging out a place for the loading track of the next shovel.

The operation of such a large number of steam shovels with stub-end loading necessarily required a large amount of switching, which explains why so many locomotives were necessary. As soon as the progress of the slide



What the Falling Wall Did to the Building.

interrupted passenger traffic on main tracks 1 and 2, this traffic was diverted to main tracks 3 and 4, while the use of the coach yard was abandoned and practically all of the tracks within the limits of the layout shown as far north as track 27 were turned over to the maintenance of way forces. In order to facilitate the use of these tracks for the steam shovel operations, crossovers were cut in as indicated by the dotted line and the passenger tracks cut off on the west end as indicated. Strings of empty cars were supplied for the engines serving the shovels and as fast as these cars were loaded they were pushed into a load track and hauled to the east end of the yard, where the cars were classified as wooden dump cars, steel dump cars and gondola cars to suit the facili-



Track Layout at the Site of the Slide, Showing Use of the Tracks in the Excavating Operations.

to destroy four large trunk cables, steam pipes, air lines, signal lines, etc.

The method of placing the steam shovels which was followed during practically all of the time that the slide was advancing is outlined in the track layout. As many shovels as possible were placed on each side of the slide, using alternate tracks, with the track between used for loading. This entailed the use of the stub-end method of loading that proved to be the only practical method

ties for unloading at the various disposal points. At some only the dump cars were accommodated, while at others some eight locomotive cranes were provided to unload the non-dump gondola cars.

This disposal service entailed the arrangement for a carefully planned organization; the switching of cars each side of the slide was under the direction of an assistant yardmaster, with a yardmaster in general charge. Close communication was maintained with the dumping

locations to insure that the cars were dispatched in such a way as to avoid congestion at any of the dumps. One serious difficulty in connection with the disposal of the material resulted from the very soft and unstable character of the soil. This was spread out through the use of spreaders to a point 27 ft. away from the dumping track. Nevertheless, it settled down and slipped away from the loading track in a manner that made it very difficult to maintain these tracks.

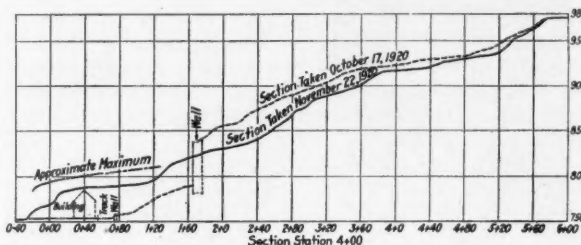
An extensive system of flood lights was installed at the slide so the work could continue through the night and the position of these lights was changed as the work progressed. The shovels also were illuminated locally to provide adequate light on all sides and underneath them.

Throughout the entire operation the work was constantly being hampered by the soft, mushy character of the material, the shifting and heaving of the tracks and the presence of a large amount of water that could not be readily drained away and, therefore, resulted in very soft tracks. One of the steam shovels was caught in the slide and it required two days' work with the aid of a large McMyler locomotive crane, equipped with a clam shell bucket, to dig it out.

The shovel operations were carried on continuously until November 18 before any sign that the removal work was keeping pace with the progress of the earth slide. By this time eight of the tracks had been covered and the ninth shovel was in service at the face of the slide. Efforts had been made to concentrate the shoveling on both sides close to the bluff, one shovel having been cut in between the car inspector's building and the bluff by building a track in from the east. It was thought that by excavating largely at the two haunches of the slide the material could be made to spread out there and thus

advance. These inner shovels then cast the material over where it could be picked up again by the outer shovels, which deposited it directly in cars on a through track. This method was obviously not most economical, but it made for the greatest possible speed in clearing up the debris. The tracks were finally cleared of the earth on November 26.

The work progressed continuously from the time that the slide cut the main tracks until they were again placed



Profile of the Slide.

in service at 7 a. m. on December 6. During this time approximately 1,400 gondola cars, 500 steel dump cars and 1,600 wooden dump cars were loaded and dispatched, removing about 130,000 cu. yd. of earth.

The maximum width of the slide measured along the main tracks which it covered was 310 ft. The maximum height attained by the mass of earth was 55 ft., or some 15 ft. higher than was the case at the time that the contours shown on the accompanying map were taken. The maximum encroachment of the slide on to the railroad property was 200 ft. from the mouth of the ravine, but measurements taken during the progress of the slide



After Slide Had Been Stopped. The Two Shovels in the Center Operated in Parallel Formation.

relieve the pressure on the face and decrease the tendency for the slide to go further. This plan of action, together with the fact that there was a large accumulation of rock at the base, finally caused the forward movement of the earth to cease and from that time on the shovels began to gain on the obstructing mass. This made it possible to institute a more progressive method of handling the shovels. Under this arrangement shovels were placed on adjacent tracks, with the two inner shovels slightly in

showed that this movement amounted actually to 305 ft. The difference in the above figures represents the extent to which the large force of steam shovels was able to beat the slide back while it was in motion.

The entire operation of removing the slide was under the immediate direction of C. W. Richey, division engineer, Pittsburgh terminal division, and under the general supervision of W. D. Wiggins, chief engineer maintenance of way, Central region.



Before the Final Shift—the 434-ft. Span on the Left—the 261-ft. Span on the Right

A NEW RECORD IN BRIDGE TRANSFERS

Complicated Series of Span Shifting and Jacking Operations

Completed on B. & O. Bridge at Pittsburgh

ONE OF THE MOST complex bridge shifting operations was carried out successfully on December 19 at Pittsburgh, Pa., when a 434-ft., 3,200-ton span was rolled about 38 ft. sidewise and a 265-ft., 1,200-ton span was lifted 15 ft. vertically during a temporary interruption to traffic. These and other complex operations constituted a most important step in the construction of a new bridge for the Chicago-New York line of the Baltimore & Ohio over the Allegheny river to replace an old structure that had become inadequate for modern train loads.

The old bridge was built in 1884 by Theodore Cooper and consisted of four through-truss, double-track spans varying in length from 167 to 250 ft. and crossing the river on a skew of 75 deg. On the east or Pittsburgh end, this bridge has a long steel viaduct approach occupying Thirty-third street, while on the west end there is a long curved approach consisting of several deck girders and a through-truss span on a sharp skew across the back channel of the river. Inadequacy of load carrying

capacity in spite of extensive reinforcement necessitated the renewal of the entire old bridge with the exception of the east approach, which had been rebuilt several years ago.

Because of waterway provisions imposed by the United States War Department, the railroad was required to build a new bridge with main river spans of 434 ft. and 261 ft., respectively, as well as an increased head room above the pool level of 8.4 ft. On account of the deeper floor of a new bridge and other considerations, the actual raise in grade was considerably more than this. The position and length of these spans was such as to necessitate an entirely new structure. A further condition was introduced in the requirement of the War Department that a 150-ft. channel way, clear of falsework, must be maintained at all times. The difficulty with this provision lay in the fact that the construction of the new piers left only one waterway opening of 150 ft., namely, that between the old Piers 3 and 4, which lie within the limits of the new 434-ft. span. Consequently, the placing



After the Shift With the Shorter Span at the Right Still at the Old Grade.

of falsework to erect this large span would close this gap of 150 ft.

With these conditions imposed it was concluded that the only feasible method was to erect the shorter river span first, substitute this for the two old Spans 1 and 2, and after removing them, tear out the old Pier 2 and thus provide a temporary waterway of 150 ft. that could serve for navigation while falsework for the 434-ft. span closed up the other channel. This plan, however, introduced another complication. Owing to the fact that the new 261-ft. span would be used to carry traffic

trusses pulled over against the north truss of the new span, to which they were lashed securely and dismantled. This operation released Pier 2 so that it could be removed to provide a new channel opening and thus permit the completion of the falsework for the 434-ft. span.

The erection of the new 434-ft. span and a new 73-ft. girder span to the west of it was prosecuted from the new west approach which had been erected previously. Owing to the fact that the new piers built for the 434-ft. span and the girder span to the west of it had to clear the under side of the old truss spans still carrying traffic

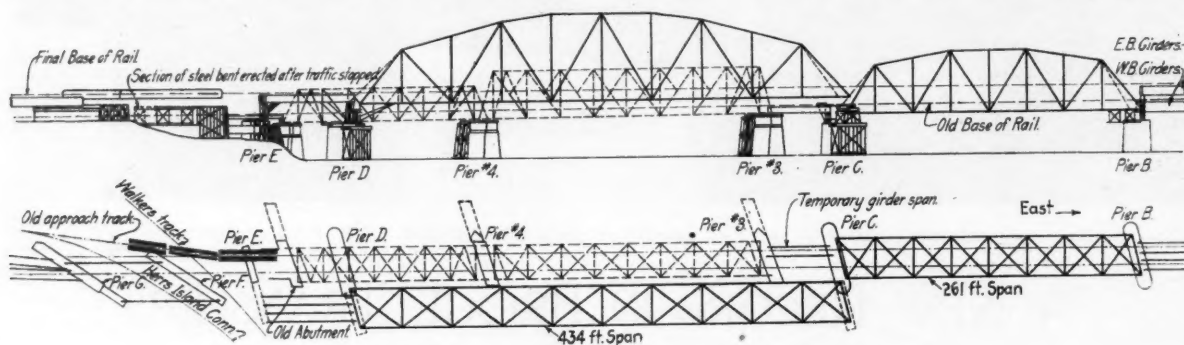
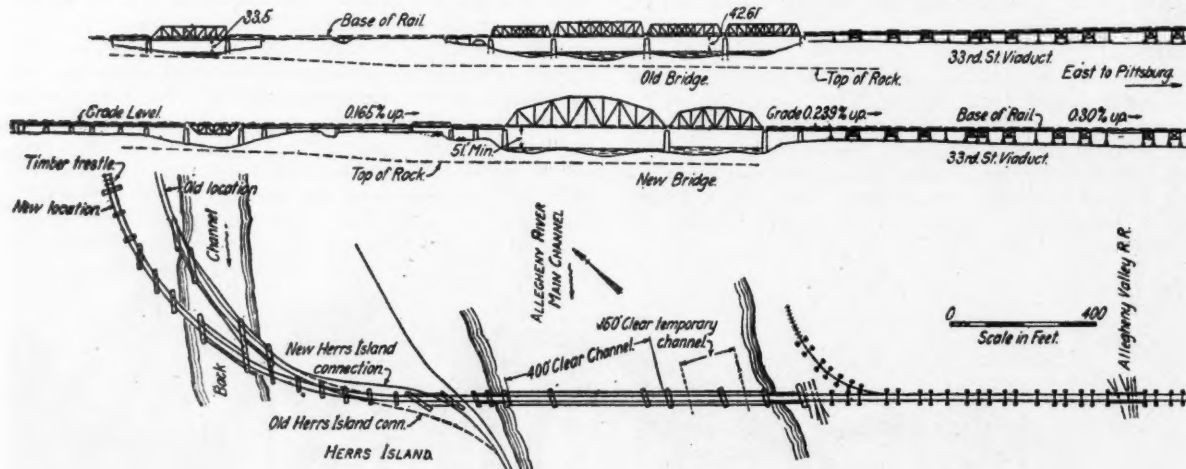


Diagram Illustrating Conditions Just Previous to the Shift Made on December 19

for a time with portions of the old bridge, it was necessary that this span be on the same grade as the old bridge. As other conditions pointed to the advisability of erecting the 434-ft. span on the new grade, it was necessary that the 261-ft. span be raised to the new grade at the time that the longer span was rolled into position.

The smaller of the two river spans was erected on falsework down stream from the old bridge, the erecting equipment and material being delivered from the east approach by means of a short trestle spur from the east-bound track. This span and a new 93-ft. approach girder

on the old grade, the new piers could not be built up to the full height necessary to receive the new spans on the high level. Consequently, it was necessary to provide the new steel spans with steel bents to support them on the piers until the concrete work could be built up around them after the spans were in final position. At Pier C, supporting the east end of the long span, this bent could be set in place as soon as the old spans had been removed. Consequently, the top of this bent was made to serve as the base for rolling in the span, but on Piers D and E this could not be done, so the bents were erected



General Plan and Elevation of the New and Old Bridges.

span flanking it on the east were rolled into position on September 1, the old Spans 1 and 2 being rolled out in the same operation. The entire change required an interruption to traffic of only three hours and three minutes. This change also involved the insertion of a temporary girder span in the westbound track to make up the gap between the west end of the new 261-ft. span and the east end of old Span No. 3.

Immediately following this change the floor systems were taken out of the two old spans and the two old

on the falsework under the ends of the old span with the rollers placed underneath the bents. In other words, it was arranged to roll the bents in with the spans.

Similar complications arose in connection with the through girder span F-G which crosses the Herr's Island connection track. This span was also erected to one side of the final location, but owing to interference with the operated track the steel bent used to roll in the east end of this span could not be erected complete until traffic was suspended. Owing to the fact that this span is on

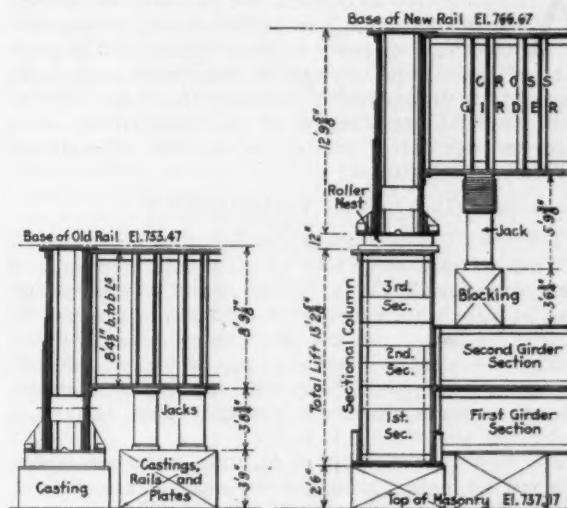
a skew of a different angle than the river bridge, the ends of the intervening Span E-F are not parallel. Consequently, it was not practicable to roll in that span and it was necessary to erect the girders after the adjacent spans had been shifted into final position. The west approach involved less complications, since it was possible to raise the girders for the eastbound track to the new grade following the placing of the 261-ft. span. Consequently, the eastbound track on the approach was ready for service on the new grade by the time that the final shifting operation was to be carried out.

THE FINAL TRANSFER

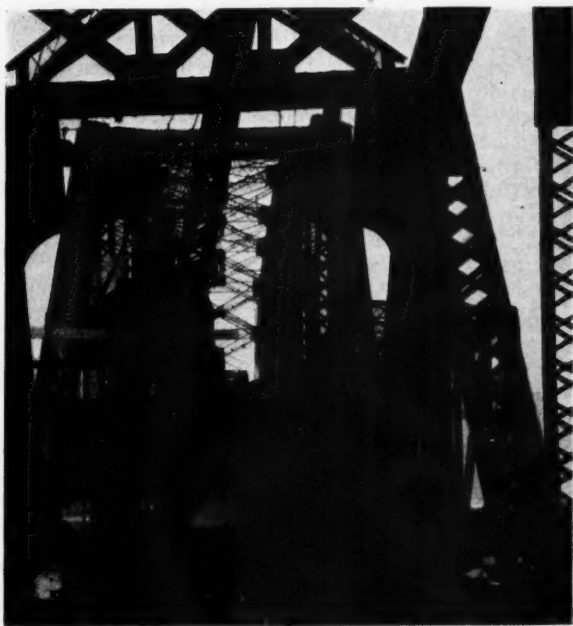
The final change to the new superstructure was made on December 20. Following the passage of the last train at seven o'clock a. m., the track was cut and temporary girders removed in the Span C-3. They were lifted out by a derrick car and carried back out of the way. Similarly, the track was cut at Pier E to clear the pier for rolling the new Spans C-D and D-E and the old Spans 3 and 4, the four spans being handled as a unit, the entire operation being completed by nine o'clock a. m. Power for this operation was supplied by two locomotive cranes standing on the long span and by a derrick car standing on the new west approach. As soon as the new spans were in final position they were jacked up sufficiently to remove the rollers and rails and then lowered to permanent bearing on the masonry.

While this work was in progress the track was cut over Pier F and the steel bent on that pier was extended to enable the Span F-G to be rolled over to final position and then lowered onto the masonry. A derrick car then

with the building up of the supporting columns under each shoe, these columns being made up in sections about four feet high, which were inserted in place as fast as progress in the jacking made room for them. To afford suitable transverse bracing for the sectional columns, sectional girders or diaphragms were introduced between the two columns at each end of the span as the raising



Initial and Final Positions of Jacking Rig for Raising the East End of the 261-ft. Span



The 434-Ft. Span in Place 15 Ft. Above the Old Grade.

came out on the Span F-G and erected the girders for the Span E-F, picking them up from trucks on the track crossing below.

The rising of the 261-ft. span was accomplished as shown in one of the drawings. Two 500-ton jacks were placed under the end floor beam at each corner of the span, the arrangement being to have one jack lifting while the other one was being fletted preparatory for the next lift. The jacking was carried on simultaneous

progressed and further advantage was taken of these girders by using them as supports for the jacks, so that it was not necessary to build up blocking for the jacks to the full height of the lift. Two of these girders were provided at the west end of the span and three at the east end, the total lift of the span being about 13 ft. at the west end and 15 ft. at the east end. While this process was being carried on, the span was being followed up by rail grillages placed on the top of the partially completed columns and arranged in such a way that only one-half of this grillage was removed until the next column section was slipped half way into place. As a further safeguard the heads of the jacks were followed up by filler plates surrounding the plungers. This stage of the work occupied the longest time, being started about nine a. m., and completed ready to take traffic on the eastbound track at 1:40 a. m. Tuesday.

Before train service can be turned over the westbound track it will be necessary to raise the girders for the westbound track on the east approach trestle to the new grade. Provision for this raise of grade was made when this viaduct was built. This was done by framing the longitudinal girders between the cross girders of the steel bents. The raise in grade was, therefore, accomplished by shifting the longitudinal girders from between the cross girders to their top flanges, supplemented by the use of shims or blocks of varying thickness. Further raise of grade was provided for in the seven spans nearest to the bridge by designing the connections of the cross girders to the columns so that the cross girders could be moved up a variable distance on the columns.

The steel in the new superstructure aggregated approximately 6,000 tons and was fabricated and erected by the American Bridge Company. The work has been carried out under the supervision of H. A. Lane, chief engineer, Baltimore & Ohio, Baltimore, Md.; W. S. Bouton, engineer of bridges, and P. G. Lang, Jr., assistant engineer of bridges. A. C. Clarke, district engineer, is in direct supervision of the work in the field.

RESULTS OF THE ANNUAL TRACK INSPECTIONS

Names of Roadmasters, Supervisors and Foremen Who Were Awarded Prizes for Excellent Condition of Their Tracks

ALTHOUGH SOME of the railroads abandoned their annual track inspection during government control, a majority of them continued the practice and those which dropped it temporarily have, since the return to private control, resumed this plan. The results on the Eastern region of the Pennsylvania were given on page 441 of the November issue. Results for additional roads follow:

THE LEHIGH VALLEY RESULTS

The annual inspection of the Lehigh Valley brought out the marked uniformity of maintenance throughout the system, together with the high degree to which it has been brought since government control. In grading the system, the judges used the following conditions and percentages as a maximum basis upon which to compare: Surface and line, each 35 per cent; ties, ballast, drainage, general appearance and anti-creeper, joints, bolts, etc., each 6 per cent.

The New York division, A. M. King, division engineer, received the highest rating, having a percentage of 97.97, with the Seneca division and the Buffalo division second and third with ratings of 97.48 and 97.10, respectively. The remaining two main-line divisions had ratings of 96.84 and 96.80.

The ratings of the supervisors' sub-divisions were as follows:

P. M. Dinan, Seneca division	98.12
J. Sheehan, New York division	97.97
C. Hewitt, Seneca division	97.66
J. A. Murphy, Seneca division	97.53
W. F. Nichols, Buffalo division	97.35
R. Cunningham, New Jersey & Lehigh ..	97.21
Edward Dinan, New Jersey & Lehigh ..	97.
B. F. McGuire, Buffalo division	96.91
M. J. Murphy, Wyoming division	96.84
H. F. Reilly, Wyoming division	96.71
A. B. Shimer, New Jersey & Lehigh.....	96.51
J. F. Camp, Seneca division	96.49

The highest rating for any one section was that of Section 65 on the Seneca division, which received a rating of 99.59 per cent as against the lowest rating of 95.50 per cent.

DELAWARE, LACKAWANNA & WESTERN

The Lackawanna inspection followed the same general lines, both in regard to methods and the awarding of the prizes as in the past. First prize foremen received \$100 in cash, a silver medal and a marker for the section. Second prize men received \$50 and a silver medal. The efficiency men received an efficiency sign, a marker for the section and \$10 per month increased compensation in connection with their salary and remain in this list so long as their sections are held up to the same high degree.

The following men were successful in connection with the different divisions over the system:

Morris & Essex Division—east end: Efficiency—John H. Hall, Danville, N. J.; first prize—A. Yannotta, Summit, N. J.; second prize—J. Phillips, Morristown, N. J.

Morris & Essex division—west end: Efficiency—E. Morgan, Blairstown, N. J.; efficiency—P. Tozzi, Portland, Pa.; first prize—J. Morgan, Johnsonburg, N. J.; second prize—L. Santis, Hackettstown, N. J.

Scranton division—east end: Efficiency—Wilson Sutton, Mt. Pocono, Pa.; efficiency—John Kocella, Pocono Summit, Pa.; first prize—R. McDonald, Moscow, Pa.; second prize—T. Grady, Tobyhanna, Pa.

Scranton division—west end: First prize—J. Fernan, New Milford, Pa.; second prize—F. Brown, Foster, Pa.

Buffalo division—east end: Efficiency—Thomas Carey, Painted Post, N. Y.; efficiency—James Greene, Savona, N. Y.; first prize—J. Romeo, Litchfield, N. Y.; second prize—A. Wicks, Campbell, N. Y.

Buffalo division—west end: Efficiency—J. C. Keating, Wallace, N. Y.; first prize—J. Smith, Cohocton, N. Y.; second prize—F. Schiavi, East Bethany, N. Y.

Bloomsburg division: Efficiency—D. Blizzard, Danville, Pa.; first prize—R. Shingler, Espy, Pa.; second prize—B. Strauser, Bloomsburg, Pa.

Syracuse division: First prize—J. Halloran, Whitney Point, N. Y.; Second prize—A. Merritt, Chenango Forks, N. Y.

Utica division: Efficiency—Joseph Biviano, Waterville, N. Y.; first prize—R. Cursh, Hubbardville, N. Y.; second prize—J. Moran, North Brookfield, N. Y.

RICHMOND, FREDERICKSBURG & POTOMAC

The annual inspection of the Richmond, Fredericksburg & Potomac was conducted and the prizes awarded in the customary manner. The awards of this road are based on the ratings of the judges and the relative costs of maintenance per mile of track. The successful men on the inspection are as follows:

First prize—J. W. Blanton, Summit, Va.	85.30
Second prize—G. C. Surlis, Hamilton, Va.	85.10
Third prize—R. B. Blank, Richmond, Va.	85.07
Fourth prize—B. J. Tombs, Penola, Va.	84.80

The ratings had a range of about 10 points, the highest percentage rating being 88.50, but having a corresponding rating on cost of maintenance of fourteenth from the top.

THE LONG ISLAND INSPECTION

The results of the annual inspection of the Long Island are sub-divided and prizes awarded for the best line and surface for a supervisor's division, for the greatest improvement in line and surface on a supervisor's district and for the best section in each supervisor's division. The successful supervisors and foremen and the awards are as follows:

BEST LINE AND SURFACE:

W. M. Steers, supervisor, Division No. 5..	\$200
F. J. Nehrhoff, supervisor, Division No. 4	100

GREATEST IMPROVEMENT IN LINE AND SURFACE:

K. M. Hammann, supervisor, Division No. 3	100
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BEST MAINTAINED SECTIONS:

Michael Papa, Division No. 1.....	100
Joseph Abbatiello, Division No. 1.....	50
John Rozzano, Division No. 2.....	100
Alfonso Falco, Division No. 2.....	50
Frank Maricio, Division No. 3.....	100
Michael Chisro, Division No. 3.....	50
Andrew Pink, Division No. 4.....	100
W. S. Jenkins, Division No. 4.....	50
J. Reichert, Division No. 5.....	100
C. Monteforte, Division No. 5.....	50

PRIZE AWARDS ON THE ERIE

In accordance with previous practice on the Erie of awarding prizes to supervisors and section foremen, whose sub-divisions or sections show the most improvement after the season's work, a prize section sign is erected on the winning section. Each region also awards a prize for the best section in the region, and a grand prize sign is erected on the winner's section.

The regular annual inspection was made with the track inspection car, which records low joints, cross section and lurches. A separate inspection was made to determine the general appearance of right of way, signs, condition of fences, road crossings, ditches and other items that go to constitute a perfect section and good maintenance.

nance. Labor conditions, etc., were also taken into consideration.

The winners of the prizes receive payment vouchers prior to the Christmas holidays. Below is list of prize awards and amounts that they received for the season of 1920:

Division	Name of Foreman or Supervisor	Division Number or Sub-Division	Amt.
Terminal	E. J. Dwyer, Supervisor	2	\$200
Graham Line	R. E. Ruby, Supervisor	..	100
New York	F. Palazonne	13	125
New York	F. K. Worzel	24	100
New York	T. Nordo	10	50
Delaware	D. A. Burrows	24	100
Delaware	J. Stephens	18	50
Wyoming	G. Stinnard	13	100
Wyoming	G. Gromlich	12	50
N. R. R. & N. J. & N. Y., P. Davidson, Super.		..	100
Greenwood Lake	J. Shelton	2	100
N. J. & N. Y. R. R., B. F. Wales		1	50
N. Y. S. & W. R. R., P. Johnardo		9	100
N. Y. S. & W. R. R., J. Kiernan		2	50
Susquehanna	W. E. Stenson, Supervisor	1	200
Buffalo	F. Fisk	3	100
Buffalo	M. L. Doody	20	125
Susquehanna	Chas. Hall	4	100
Susquehanna	J. S. Young	30	50
Allegh. Div. (River L.), H. Smith		2	100
Allegheny	C. S. Lusk	3	50
Buffalo	C. Peters	39	100
Buffalo	M. Flick	16	50
Tioga	J. G. Leonard, Supervisor	1	100
Tioga	E. F. Skelly	7	50
Rochester	A. Trenholm	10	100
Rochester	P. Baker	22	50
Dunkirk Branch	L. Snyder	23	50
Bradford	J. Capozzi	5	25
Niagara Falls	M. Sullivan	9	50
Kent	A. J. Bernard, Supervisor	2	200
Mahoning	Chas. Pierson, Supervisor	3	100
Mahoning	E. Parlo	21	125
Meadville	L. L. Comstock	21	100
Meadville	Thos. Gilles	38	50
Mahoning	S. Peratta	26	100
Mahoning	L. Occhinz	8	50
Kent	L. J. Danals	28	100
Kent	L. N. Davis	21	50
Marion	Wm. Murtaugh, Supervisor	2	200
Marion	M. Anderson	38	125
Marion	A. Spees	17	100
Marion	J. H. Spahr	22	50
Cincinnati	O. Smith	9	100

THE PENNSYLVANIA AWARDS

The results of the track inspection in the Central, Northwestern and Southwestern regions of the Pennsylvania System are given below:

In the Central region, R. E. McCarty, general manager, awarded a prize of \$600 to H. A. Gass, supervisor, and one of \$200 to W. E. Baker, assistant supervisor, with headquarters at Derry, Pa., as a result of the special Main Line Track Inspection committee's commendation for the best line and surface maintained on the Pittsburgh division during 1920. Three other premiums of \$200, \$150 and \$100, respectively, were awarded as a result of the general manager's annual track inspection of October 18, 19 and 20, to John Wright, supervisor on the Eastern division, with headquarters at Wooster, Ohio; J. F. McKenna, supervisor on the Eastern division, with headquarters at Canton, Ohio, and G. W. Myers, supervisor on the Eastern division, with headquarters at Alliance, Ohio. The following supervisors were awarded \$100 premiums for the best maintained track during the year on each superintendent's division:

Name	Division	Headquarters
Simon Clary	Pittsburgh Terminal	Carnegie, Pa.
E. W. Durban	Marietta	Cambridge, Ohio.
M. E. Davin	Wheeling	Steubenville, Ohio.
W. H. Saltsman	C. & P.	Ravenna, Ohio.
S. C. Hofmeister	E. & A.	Jamestown, Pa.
D. H. Kauffman	Akron	Mt. Vernon, Ohio.

J. R. Scarlett
J. L. Gressitt

Conemaugh
Monongahela

Verona, Pa.
West Brownsville
Junction, Pa.
Olean, N. Y.
Titusville, Pa.
Kane, Pa.

J. D. Archibald
C. F. Miller
T. M. Woodward

Buffalo
Allegheny
Renovo

In the Northwestern region, T. B. Hamilton, general manager, awarded a first prize of \$250 to Charles McCarthy, supervisor on the Logansport division, with headquarters at Union City, Ind.; second prize, \$200, to John H. Britton, supervisor on the Logansport division, with headquarters at Logansport, Ind., and third prize, \$150, to R. Pett, supervisor on the Mansfield division, with headquarters at Van Wert, Ohio. In connection with these awards, foremen having the best section on each supervisor's division each received a prize of \$50, the following foremen qualifying for the prizes: Phillip S. Crawford, John Kearne, Gustave Everett, John Dwyer and Lorenzo Hayward, of the Logansport division; D. Karlson, J. W. Whitesell and H. Marquart, of the Fort Wayne division; Phillip O'Connor and W. M. Goddard, of the Mansfield division, and Peter Zarruney and J. J. English, of the Chicago Terminal division.

In the Southwestern region, the general manager's track inspection resulted in the award of a first prize of \$200 to W. A. Byrkit, supervisor on the St. Louis division, Brazil, Ind.; a second prize of \$150 to R. J. Boyle, supervisor, St. Louis division, Effingham, Ill., and a third prize of \$100 to M. E. Boyle, supervisor, St. Louis division, Greenville, Ill.

Prizes of \$50 were given to the section foremen for the best section on each supervisor's subdivision.

CANADIAN PACIFIC PRIZE WINNERS

On the Eastern lines of the Canadian Pacific, the general manager's prize of \$100 for the best section on all divisions was awarded to S. McCarthy, section foreman at Chalk River, Sudbury division, Algoma district. In addition to this award prizes of \$50 were given to the foreman with the best section in each general superintendent's district, prizes of \$25 for the best section on each division and prizes of \$10 for the best section on each roadmaster's subdivision. The awards are listed below:

NEW BRUNSWICK DISTRICT

General superintendent's prize, \$50, to J. Meulendyk, Section 2, Moosehead subdivision, Brownville division.

Brownville Division—A \$25 prize to C. Lamontagne, Section 17, Moosehead subdivision, and \$10 prizes to H. Taylor, W. Tracey, V. Newman and E. Gagnon.

Woodstock Division—A \$25 prize to F. W. Richardson, Section 1, St. Andrews subdivision, and \$10 prizes to S. R. McCrum, F. Dickinson and J. St. Peter.

QUEBEC DISTRICT

General superintendent's prize, \$50, to E. Brown, Section 6, Newport subdivision, Farnham division.

Farnham Division—A \$25 prize to E. Demeules, Section 10, Adirondack subdivision, and \$10 prizes to C. Prangley, D. Chabot, E. Bessette and J. Thompson.

Montreal Terminals Division—A \$25 prize to A. Belec, Section 3, and a \$10 prize to D. Lavoie.

Laurentian division—A \$25 prize to X. Crete, Section 13, Trois Rivières subdivision (West), and \$10 prizes to N. Langlois, A. Pillard, O. Giroux and A. Pauquette.

Ottawa Division—A \$25 prize to H. Hano, Section 11, M. & O. subdivision, and \$10 prizes to A. Seguin, T. A. Kelly and A. Martineau.

Smith's Falls Division—A \$25 prize to A. Scheels, Section 12, Chalk River subdivision, and \$10 prizes to P. Lapier, A. Logan and H. Foster.

ONTARIO DISTRICT

General superintendent's prize, \$50, to R. Young, Section 4, Oshawa subdivision, Trenton division.

Trenton Division—A \$25 prize to W. Hannah, Section 14, Belleville subdivision, and \$10 prizes to W. Lillie, L. Linton, V. Adair, C. McCullough, T. Whiticar and G. Pickell.

London Division—A \$25 prize to D. Ramsey, Section 10, Galt

subdivision, and \$10 prizes to A. Fairbanks, P. Laur, J. Bishop and F. Skinner.

Bruce Division—A \$25 prize to J. Courtney, Section 8, Mac-Tier subdivision, and \$10 prizes to J. Telford, J. McMiner and J. Hissop.

Toronto Terminals—A \$25 prize to R. Gollinger, Section 15, Hamilton Terminals, and a \$10 prize to F. Tuckley.

ALGOMA DISTRICT

General superintendent's prize, \$50, to M. Cetchuk, Section 2, Parry Sound subdivision, Sudbury division.

Sudbury Division—A \$25 prize to T. A. Hall, Section 15, Thes-salon subdivision, and \$10 prizes to J. Whyatt, W. Evans, A. Bouillon and T. Penfold.

Chapleau Division—A \$25 prize to M. Pikarchuk, Section 8, White River subdivision, and \$10 prizes to M. Hakkinen and R. Beaupre.

Schreiber Division—A \$25 prize to J. Michaud, Section 6, Heron Bay subdivision, and \$10 prizes to J. Didych and G. Person.

THE PERE MARQUETTE RESULTS

Following the annual inspection on the Pere Marquette a prize of \$100 was awarded to W. C. Cole, track supervisor at Edmore, Mich., for the highest rating as to condition of track, etc., in a supervisor's sub-division, and a sum of equal amount to F. D. Harrigan, track supervisor at Saginaw, for the greatest improvement over the previous year.

Prizes of \$25 each were awarded to section foremen on each track supervisor's sub-division, for the best general conditions, as follows:

Name of Foreman	Section Headquarters
Wm. Krajewski	Wyoming
Dell Dunham	Sawyer
Mead Beard	Shelby
Wm. Dickenson	Kaleva
Leonard Garnett	Grawn
Geo. Wilkins, Sr.	Williamston
Wm. Francis	Shedden
Abraham Armstrong	Birch Run
Lyman B. Lawrence	Freeland
Raymond Sherman	Tappan
Wm. Moulton	Merrill
Wm. Chudley	Mecosta

To the section foremen on each track supervisor's sub-division making the greatest improvement as compared with 1919, prizes of \$25 were awarded:

A. Moore	Wellsboro
Wm. Bailey	Montague
Carl Robart	Bitely
Edgar French	Bendon
John Steinmetz	Lake Odessa
Fred Hodge	Rodney
Fred Hopp	Plymouth
Ernest Mott	Coleman
Ralph Ward	Avoca
Alex Clark	Clifford
Bert E. Weed	Portland

UNUSUAL METHODS CREATE INTEREST IN TRACK INSPECTION

AN INSPECTION of the roadway and tracks on the Southeastern district of the Southern Railway early in November formed the climax of an interesting campaign in which a number of novel methods were introduced to stimulate interest among the foremen, supervisors and division officers. At the completion of the inspection it was the opinion of those in charge that more real constructive track work had been performed between the initiation of the campaign, on August 1, and November 1, than they had been able to secure in any four or five months in previous years.

The initial step in the campaign to develop interest in the inspection among the foremen and supervisors was a letter addressed by F. P. Pelter, general superintendent of the Southeastern district, to the other general super-

intendents on the Western lines on August 21, advising these general superintendents that the Southeastern district was setting out to secure the best track and the highest percentage of standard, clean, smooth riding and safe track on the lines of the Southern at the time of the annual inspection. Copies of this letter were sent to each supervisor and section foreman, who at once realized that it was up to him to do his part by bringing the track under his supervision up to the proper standards. Other letters of a similar nature were sent out from time to time. Thus on August 24 the following was sent out by the general superintendent:

"This is to serve notice on you that if you have any supervisors or foremen who are lagging behind, or are short of 'pep,' you had better cross them with lightning bugs or owls so you can get a little night work out of them. This is the only method that I can see that will place you in a position to expect to be in the running."

Poetry was also resorted to at intervals, as is indicated by the attached:

Said the supervisor to foreman John,
Our fall track work has just begun,
Our ties are in, our joints are tight,
But, we have just commenced the fight.
The right of way must be cut down,
The grass shaved off close to the ground,
The weeds pulled out of ballast line,
The ditches cleaned of dirt and slime.
Then just as the sun goes down,
When the rail is cool and can be moved around,
Without its jumping off of the fill
Skinning our shins, making us ill,
We'll line her till she's smooth and true,
According to transit and level, too,
We'll give her the little extra shakes,
'Till she fits exactly, the algebra stakes,
Then we will drive home every spike,
And have a perfect riding "pike."
From the glass of water on the window sill,
Not a single drop will ever spill.
Then just before inspection time,
We will open up a barrel of lime,
And mix our whitewash so it will
Meet all specifications in the bill,
And to the cattle guard fences go,
Nail on the boards, that have felt the blow,
Of a yearling steer that held the track,
'Till he was hit by a speeding "Jack."
Going the gait; about forty-eight,
Which caused a claim to originate,
When the boards are on and the nails are down,
We'll run those white wash brushes around,
And when we leave, that old stock gap,
It'll be white as "Granny" in her nightie and cap.
And when we reach a roadway sign,
We'll show mound builders, we know their line,
By building mounds around those posts,
And coloring them as white as ghosts.
When we've reached the end of the section,
We'll be ready for inspection,
Then we'll say to that inspection train,
"Come on down before it rains,
And spoils some of the lovely view
That we have fixed up for you."
They will all look out when the train goes by,
And gaze on our track with a critical eye.
The roadmaster will scatter "butterflies"
Saying, "Inspection is over, get after your ties."
But back in his head, he'll make some notes,
Which will make a split twixt the sheep and the goats,
He'll know which is the best and which is the worst,
And the best will be promoted first,
And there'll be "Hell-a-poppin'" for the ones that's worst.
So jump in the game before its too late,
November the first is inspection date.

While no prizes were awarded, the keen interest which had been created in the inspection resulted in the track being brought into much better condition than would otherwise have been possible. Improvement in ditching and in policing of the right-of-way was particularly marked.

SAVING MONEY BY WATER TREATMENT

What the Rock Island Has Done to Solve the Problem of Providing Good Boiler Waters

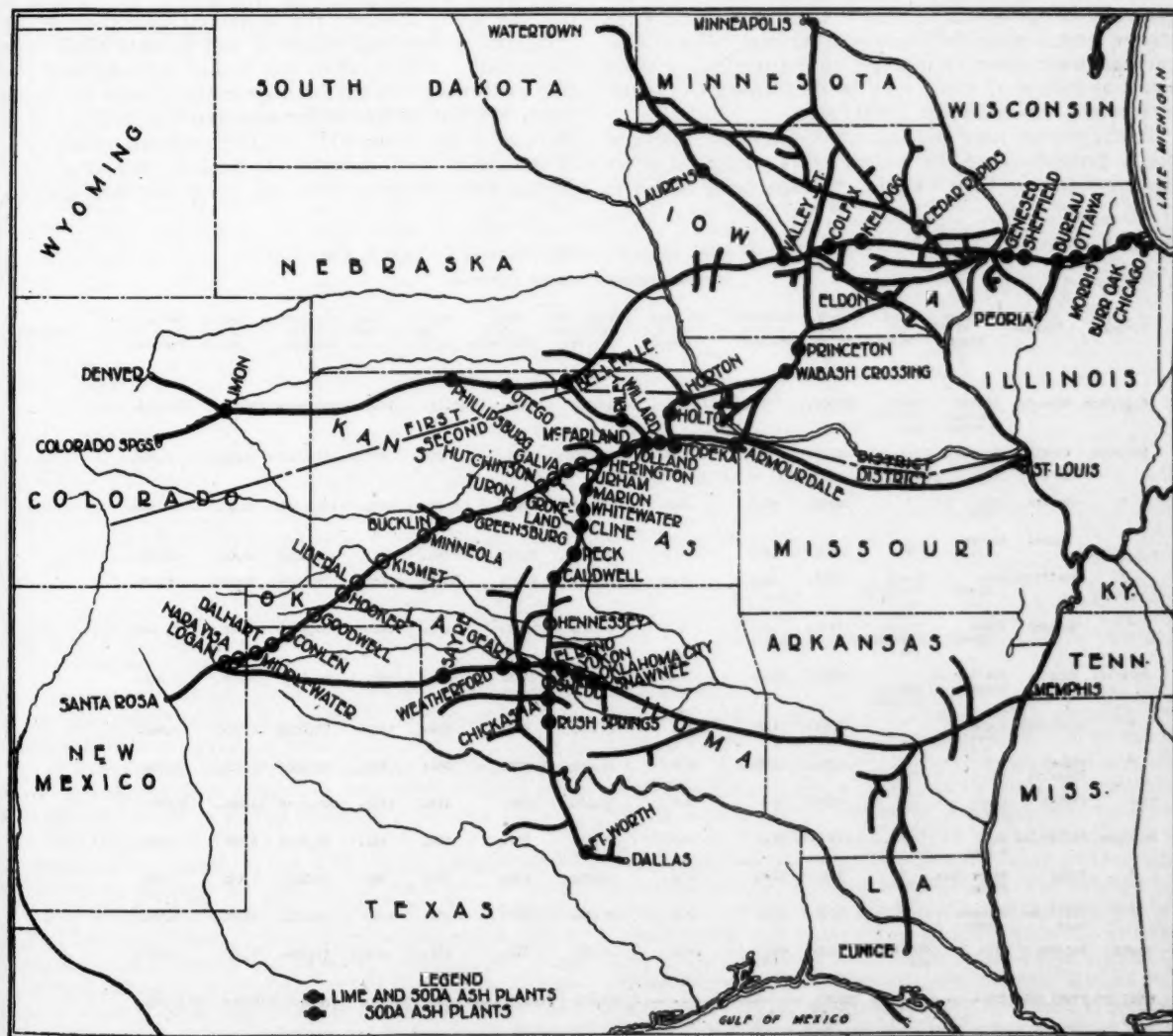
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THE ROCK ISLAND SYSTEM serves a territory of which the outlying points are Chicago; Memphis, Tenn.; Fort Worth, Tex.; Santa Rosa, N. M.; Denver, Colo., and Minneapolis, Minn. On its lines there are 412 water stations, or one about every 20 miles. The spacing of these stations is not dependent upon whether they are convenient places to get water, but upon the needs of the locomotives. It will, therefore, be readily understood that each station must necessarily be a problem of itself, although, like all transportation matters, it must also form a link in the chain. The weakness of one link will reduce the strength of the entire chain.

Perfect boiler water is rarely found in nature. It is so rare that it is practically non-existent and in the above territory it varies from fair to bad or worse. There are usually some handicaps, even when the supply is plenti-

ful. The best in this territory is found in Minnesota, Missouri, Arkansas and Louisiana. But even in these states, if wells are resorted to they will frequently give hard water. In addition the surface water usually carries silt for part of the year at least. In Illinois, Iowa, Nebraska and Kansas the water is either muddy or hard, usually both. In the southwest it is scarce and contains another class of impurities which are known by the generic term, "alkali."

In the development of water in this large area many methods have been followed. The easiest is to buy of a municipality, and this is done at 25 per cent of the stations. The balance is handled by company forces. About 50 per cent of the water comes from open or tubular wells, 25 per cent from streams, 10 per cent from impounding reservoirs and the balance from lakes, springs,



Map of the Rock Island System Showing Water Treating Plants.

etc. From these various sources over eight billion gallons are pumped by company forces per year and over one billion gallons are purchased from others. The methods of pumping the water are as varied as the sources of supply. Steam, internal combustion engines, electricity and gravity stations are found. However, the policy of late has been to use other power than steam except where the exhaust can be utilized for heating or other purposes.

Chemical analyses are made at intervals of all water used by locomotives. Before any prospective supply is used an analysis is first made. A tabulation of these analyses shows that out of 412 sources of supply, 290 furnish water of over 10 grains hardness per gallon. Of the 117 stations which take water from streams, all may be said to carry large quantities of silt part of the year and a number practically all of the year.

In 1904 the executive officers became interested in the softening of water by the Porter-Clark process. The first plants built were of the gravity-flow intermittent type. These were followed by the repumping intermittent variety and finally by the continuous type of steel construction. Since its introduction, the continuous type has been used in the majority of cases except where special circumstances have favored the gravity intermittent type. The lack of available funds for this, as well as other construction work, in the last 10 years has prevented any large program being carried out, the policy generally being to pick out the isolated points where the money returns were the greatest at the time. These comparisons were made by multiplying the number of thousands of gallons of water used by the number of pounds incrustants removable per 1,000 gal.

At the present time this has resulted in plants scattered pretty generally over the system and a change in policy has consequently been adopted, the aim being to fill in

the "blank" points and thus secure engine districts on which all the water requiring it will be treated. Another point of view has also entered into the subject, that is, the clarifying of water. Muddy water does more damage than is ordinarily appreciated. As mud is readily removed in a softener, the muddy water territories with hard water are to be handled with reference to both the suspended and dissolved solids.

With this object in mind the worst bad water territories (quantity and quality both being considered) naturally divide themselves into two areas which are somewhat different in character, but of equal importance from an operating point of view. The first of these is on the line extending from Chicago to Valley Junction, Iowa; from Davenport, Iowa, to Trenton, Mo. (between Princeton and Wabash Crossing), and from Bureau, Ill., to Peoria. This is heavy traffic territory in which delays due to locomotive boiler troubles would be of prime importance. As explained in a previous paragraph the water is hard and, in wet weather, the streams carry a large amount of mud.

The second territory referred to extends from Kansas City to Santa Rosa, N. M.; from Herington, Kan., to Fort Worth, Tex., and from Shawnee, Okla., to Sayre. This district is different in character from the first. The water carries somewhat greater quantities of incrustants, but muddy streams are fewer in number. In addition to this the water towards the southwest is higher in the sulphates of lime and magnesia and various alkali salts are present. The result of this is that corrosion and pitting are found. It has been generally known for some years that this trouble is due to electrolytic action and in this case is superinduced by the large amount of sulphates in the water. It is thought that the best method of remedying this will be to have all water in these districts

STATEMENT OF THE RESULTS OBTAINED BY WATER TREATMENT

FIRST DISTRICT - Aug. 1st 1919 -1920.

Division	Station	Source of Supply	Kind of Plant	Cost of Plant	Hardness before Treatment	Hardness after Treatment	Total "H" Gallons Treated	Cost of Chemicals	Labor and Suprn.	Total Cost.	Incrusting Solids Removed	Saving at 10¢ per lb.	Saving Less Cost of Treating	Remarks.
Chgo.Tenn.	Burr Oak	Little Calumet River	Booth Continuous	\$27208.	21.0	5.0	145,000	\$8554.	\$2111.	\$8665.	326,800#	\$32,680	\$34,021.	
Illinois	Morris	Illinois River	Graves Continuous	25272.	15.0	4.50	60,000	1212.	300.	1612.	75,000#	7,500	5,768.	
"	Ottawa	Fox River	"	35222.	20.0	4.5	75,000	1750.	300.	2050.	180,000#	18,000	15,045.	
"	Bureau	Bureau Creek	"	37155.	18.0	4.0	132,000	3155.	345.	3511.	284,000#	28,400	22,869.	
"	Sheffield	Coal Creek	Booth Continuous	9119.	24.0	5.5	36,000	1600.	1280.	2880.	95,000#	9,500.	8,220.	
"	Geneseo	Green Creek	Graves Continuous	20887.	16.0	4.0	42,000	1185.	250.	1435.	84,000#	8,400.	6,965.	
Missouri	Eldon	Des Moines River	Intermittent	14510.	20.0	4.5	90,000	2322.	300.	2622.	300,700#	20,070.	17,448.	
"	Princeton	Grand River	"	3007.	14.0	4.0	54,000	899.	319.	1218.	77,000#	7,700.	6,482.	
"	Wabash Crossing	"	"	3124.	12.0	4.5	50,000	655.	269.	922.	53,800#	5,380.	4,428.	
Iowa	Golfax	Skunk River	"	8952.	20.0	5.0	50,000	1128.	365.	1505.	107,000#	10,700.	9,197.	
Nebraska	Bellerive	pond & Well	"	3575.*	14.0	5.5	30,000	707.	234.	931.	36,400#	3,640.	2,709.	
"	Otoe	White Rock Creek	"	1540.	22.0	6.5	7,000	360.	230.	590.	15,500.	1,550	970.	
"	Phillipsburg	Solomon River	"	5280.*	19.5	5.5	34,000	810.	230.	1040.	68,000.	6,800.	5,760.	
Dakota	Laurens	Well	Continuous	409.	44.0	12.0	3,600	213.	390.	603.	16,700.	1,670.	1,067.	
TOTAL FOR FIRST DISTRICT				160205.			805,600	\$22559.	\$6935.	\$29472.	1,079,600#	\$107,960.	\$126,304.	

* Estimated Cost.

Net saving equivalent to 75 percent per year on total investment.

STATEMENT OF WATER SERVICE RESULTS—CONTINUED

SECOND DISTRICT—Year 1919

Division	Station	Source of Supply	Kind of Plant	Cost of Plant	Hardness before Treatment	Hardness After Treatment	Total "M" Gal. Water Treated	Cost of Treatment	Incrusting Solids Removed #.	Saving at 10¢ per lb. Removed	Saving Less Cost Treating	REMARKS
K.C. Term	Armourdale	Wells	Intermittent	3682.83	83.0	7.0	82100	10621.70	826440	\$2644.00	\$1922.38	
Kansas	Horlow	Creek	"	5000.00	13.0	4.5	15740	1858.86	18888	1888.80	333.14	
"	Holton	"	"	2686.00	18.0	5.0	7703	931.15	18406	1840.80	609.46	
"	Topeka	Wells	"	7340.34	31.0	5.0	40535	3032.87	134085	13408.50	10373.93	
"	Willard	Well	"	2039.30	19.0	5.0	28500	1863.28	86800	8680.00	6816.72	
"	McFarland	Creek	"	2267.00	22.0	5.0	60034	4031.86	144081	14408.10	10366.34	
"	Wollard	"	"	4000.00	24.0	5.5	13798	970.32	34498	3449.80	2479.18	
"	Marion	Creek	"	7158.50	33.0	5.0	130880	6556.96	828440	\$2344.00	48787.03	
"	Marion	City	"	2800.00	33.0	5.0	7731	2150.17	28779	2877.90	727.75	
"	Whitewater	Creek	"	1851.50	68.0	30.0 #	4780	1307.13	33530	3353.00	2045.87	Not Practical to use here
"	Cline	Wells Continuous (Noth)	"	5282.00	26.0	9.0 **	12340	971.49	31834	3183.40	2210.91	Treatment caused by delay to new
"	Peck	Wells Intermittent	"	3886.00	16.5	3.5	6090	496.25	12180	1218.00	718.75	Repair parts
"	Caldwell	City	"	4500.00	21.5	4.5	28989	2088.43	53988	5398.80	2818.37	
"	Kiley	Well	"	3818.00	70.0	13.0 #	2019	964.73	16132	1613.20	680.47	Not practical to use here
Oklahoma	Hennessey	Well Soda Ash only	"	300.00	35.0	26.0	1700	153.22	2100	210.00	48.78	treatment
"	El Reno	River Continuous (Davidson)	"	13506.12	24.0	5.0	76505	5346.54	191263	19126.30	12779.85	
"	Chickasha	Wells Intermittent	"	8772.80	31.5	5.0	64846	5652.73	356189	35618.90	28053.18	
"	Rush Springs	City	"	3745.00	42.0	5.0	14980	959.95	29960	2996.00	2036.05	
Ind. Terr.	Shawnee	River	"	6880.00	18.0	3.5	87185	3101.03	208245	20824.50	17833.48	
Pan Handle	Tulsa	"	"	5000.00	21.5	5.0	14255	1180.19	28510	2851.00	1700.81	
"	Geary	City Continuous (Kernicott)	"	8806.00	20.0	4.5	23426	1388.53	45852	4585.20	3199.87	
"	Weatherford	Wells	"	8899.05	38.0	7.0 ***	11800	1855.81	47300	4730.00	3064.19	***inc. high alk. Salts
"	Wayne	Wells	"	6081.00	38.0	5.5	38080	3429.86	156320	15632.00	12202.14	
El Paso	Durham	Creek Soda Ash only	"	331.73	22.5	12.5	11193	328.34	16670	1667.00	1341.66	
"	Galva	Wells	"	174.16	18.5	14.0	19908	483.09	11940	1194.00	741.91	
"	Crowland	"	"	125.29	19.5	17.0	11678	144.21	2088	208.80	181.09	
"	Butchinson	City	"	1001.03	24.0	17.0	15613	873.19	15613	1561.30	988.14	
"	Turon	Wells	"	305.86	13.5	9.8	8702	136.13	7806	780.60	648.48	
"	Greensburg	"	"	148.78	12.0	10.5	10236	133.85	2047	204.70	70.85	
"	Franklin	"	"	204.83	15.0	12.0	18638	347.84	7449	744.90	397.06	
"	Mineral	"	"	384.00	12.5	10.0	14915	280.17	4478	447.80	167.33	
"	Kismet	"	"	186.70	16.0	12.5	16334	340.98	8177	817.70	476.72	
"	Liberal	"	"	920.00	22.0	13.0	23500	296.78	30580	3058.00	2756.22	
"	Hooker	"	"	380.70	16.0	12.0	15287	436.46	7618	761.80	336.31	
"	Goodwell	"	"	154.42	13.5	11.0	12386	367.13	5485	548.50	181.38	
"	Kanawha	"	"	386.00	13.5	9.0	22049	329.99	15239	1523.90	903.91	
"	Logan	"	"	185.00	22.0	15.5	16347	371.40	16347	1634.70	1233.30	
Mexico	Condon	"	"	180.80	14.5	11.0	11960	184.86	5890	589.00	404.34	
"	Dalhart	"	"	463.50	16.0	12.5	67800	461.36	33780	3378.00	2893.64	
"	Hidgewater	"	"	386.00	12.0	10.0	7777	112.43	2331	233.10	120.68	
Southern Fort Worth	River Intermittent	"	"	2380.00	11.0	3.0	67775	863.66	67775	6777.50	5913.94	
TOTAL FOR SECOND DISTRICT				\$126584.82			1180370	\$7986.20	2961480 lbs.	\$296248.00	\$220388.80	
Net saving equivalent to 183 per cent on total investment per year.												

SUMMARY OF RESULTS OF WATER TREATMENT ON THE ENTIRE SYSTEM

	Cost of plant	Total M. gals. Treated	Cost Chemicals	Labor and Supervision	Total	Incrustants lbs. removed	Saving at 10¢ a lb.	Net Saving
First District	\$180203.00	803600	\$22539.00	\$6933.00	\$29472.00	1577660	\$157766.00	\$128294.00
Second District	125384.00	1150370	not given	not give	67986.00	2982450	298245.00	230258.00
System	305587.00	1953970			97458.00	4560110	456011.00	358552.00

Net saving equivalent to 111 per cent on investment.

under chemical control. This will give an opportunity to work out such methods as scientific investigation may make available from time to time.

The table shows that, in one year, the total amount of water given complete treatment was 1,642,510,000 gal., and the amount given partial treatment with soda ash was 311,460,000 gal.

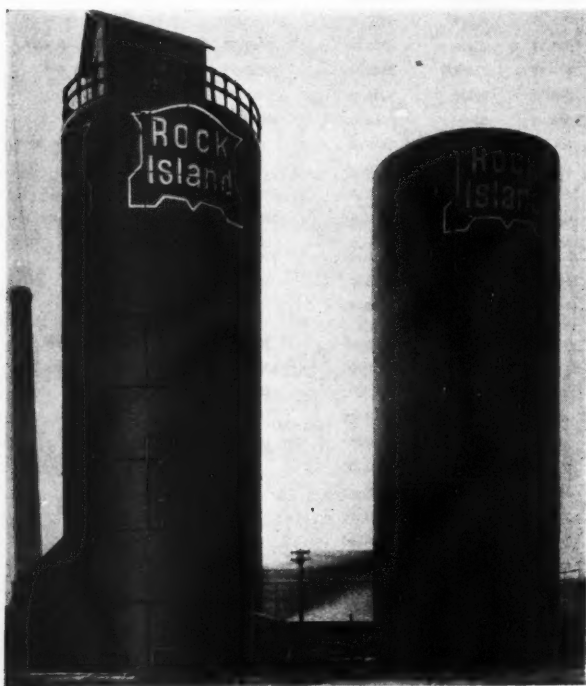
Computations based on the A. R. E. A. formula of 10 cents saved through the removal of each pound of incrusting solids give the total of \$358,552 saved per year, not including interest, repairs or depreciation of plant. The total cost of plants was \$305,587. This gives a gross operating saving of 117 per cent. If the interest on the cost of plant is 6 per cent this will be reduced to 111 per cent. Depreciation and repairs will subtract another 8 per cent and thus leave the net profit at 103 per cent on

invested capital. In this computation no credit has been taken for mud removed, although a large quantity has been taken out at many of these points. At all in which the supply is marked "river" or "creek" large amounts are carried by these streams. The saving due to the elimination of mud must be estimated in each particular case. No formula of general applicability has been devised.

In this accomplishment two elements have entered into the result, namely, supervision and design. The two operating districts of the Rock Island each have a supervisor of chemical tests and a supervisor of water stations, in addition to the division forces, whose duties require them to follow the daily operations of each station. By the follow-up methods installed, satisfactory treatment is secured with all the different types of plants when operated properly. When in good working order the question of oper-

ating capacity is the principal element of difficulty. The capacity varies even with apparatus of the same design and any crowding or hurrying the process produces much harm. The "intermittent" and "soda ash" apparatus is home made. With a few exceptions the tubs are wooden. The "continuous type" machines are of the general type made by the patentees at the time of installation, with such variations as were thought to best suit local conditions.

Among the continuous type machines there are several different varieties. At Burr Oak the water is treated



Water Softening Plant at Armourdale, Kan.

and stored in one tank. At the time this station was built only one tank was available. The water is from the Calumet river and is pumped to a high, small diameter standpipe, whence it flows to the treating and storage tank by gravity. The supply fluctuates greatly. In addition the water sometimes registers over 100 deg. F., due to the discharge of cooling water from some turbo generators near the intake of the pumps.

The tank is 50 ft. in diameter by 50 ft. high, with a 12-ft. downtake and has a rated capacity of 50,000 gal. per hr. Some changes have been made since its installation which have added to the amount of agitation, both for chemicals and mixing with raw water. A water wheel drives the agitators in the downtake. An electric motor drives the chemical mixers and pumps on the ground level. The control apparatus is of the Booth make.

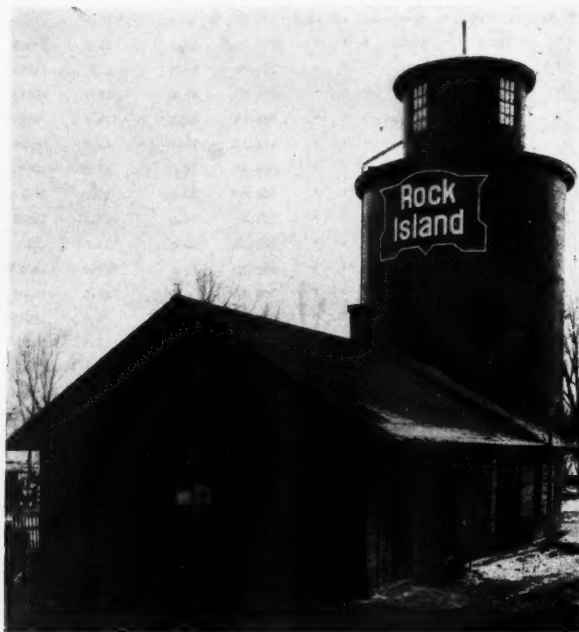
With this machine hardness has been reduced from 21 to 4 gr. per gal. and averages 5. The cost is much lower than some others due both to the design and a favorable market. The table shows the cost \$17,205 and the gross saving \$24,021 per annum.

On the Illinois division there are four continuous type softeners. In order to conserve labor they are all installed adjacent to the pumping plants so that the pumper can operate and care for them. At three of the stations, owing to the extreme distance from the pumping plants to the storage tanks, it was found necessary to repump the treated water. These plants are all of the type K-Graver

construction with a quartz filter in the top and double agitators in the downtake. One pump forces the water into the softener and another of the same capacity takes the water after it is filtered and sends it through the long pipe line to the storage tank. One of the photographs shows the treating plant at Geneseo, Ill., where a pipe line two miles long is required. This plant has a rated capacity of 15,000 gal. per hour.

The most recent type is shown in photograph of the softener at Armourdale, Kan., the engine terminal at Kansas City. It was built in two steel standpipes which had been erected some years before, the machinery in Graver Type K. The treating tank at the left has a downtake with a set of double agitators driven by a water wheel. This is the only machinery on top, the balance being on the ground. When the water rises to the top of the softener, it is carried down again by a 12-in. pipe to the bottom and across to the storage tank. The outlets in the latter are at an elevation of 22 ft. By this means the water is given 2½ hours more time to settle after leaving the softener. The apparatus has no filter.

At the present time a softener of the same type rated at 60,000 gal. per hour is being built by the Railway Water and Coal Handling Company, Chicago, at Valley Junction, Iowa, an important terminal point. There is this variation, however—the tanks have been placed farther apart



Water Treating Plant at Geneseo, Ill.

to permit of the placing of a pressure filter between them at a later date if experience shows that it is desirable.

The Armourdale plant illustrates what may sometimes be done by changing the supply. The former intermittent plant's results are shown on the table. The supply was taken from a number of wells. To get within suction distance a 25-ft. pump pit was used. The water was pumped into the right hand steel tank. From this it flowed by gravity into two 100,000-gal. wooden tubs for treatment. After treatment the water flowed into a pit and was then pumped into the standpipe. A new supply of better quality was secured and the continuous type apparatus installed. The saving on pumping and chemicals is about \$18,000 per year, while the change cost about \$15,000.

RAILROAD DEVELOPMENTS DURING 1920

Study of the Year's Record Shows Continued Restriction in Construction and Equipment

THE YEAR 1920 drew to a close under conditions decidedly encouraging for the rehabilitation of the roads during 1921 and following years. Traffic throughout the major part of the year was heavier than in any previous year in spite of the greatly depleted number of cars, inadequate terminals and yards, and much deferred maintenance with which the roads were confronted at the beginning of 1920. Financial conditions were uncertain and formed one of the main reasons for the almost complete lack of new construction. In general, only those expenditures were made that were absolutely necessary to maintain operation and little attempt was made to place the properties or equipment in a condition whereby future benefits or economies could be derived. Though traffic decreased during the last six weeks of the year the business outlook for 1921 is good with prospects for as heavy tonnage as was hauled in 1920.

Realizing the need for a speedy return to a progressive rehabilitation program, the *Railway Age*, in a special issue of January 7, presented many facts derived from past and present performances and business conditions, bearing on this need.

Included in this material were articles and statements of leading railway executives who voiced their opinions on the necessity for the expansion of railway facilities to meet the requirements for the traffic which will be offered to the railroads during the present year.

Thus, Daniel Willard, president of the Baltimore & Ohio, and chairman of the Advisory Committee of the Association of Railway Executives, said: "While it is true that there is a surplus of transportation facilities, particularly box cars and freight locomotives, in the United States today, it does not by any means follow that such will be the case two or three months from now. I cannot help feeling that the transportation facilities of the railroads will be fully used by next spring, say March or April. I think it is highly desirable, not only from the standpoint of the railroads but in the public interest, that, wherever possible and as much as possible, advantage be taken of the surplus facilities now to ship in anticipation of the wants later on. It is certain that the railroads, with their present facilities, are not able to take care of the possible 'peak' loads, and this is why I think it is wise to urge upon all who can do so to ship now."

R. H. Aishton, president of the American Railway Association, called attention to the housing shortage. "Is it not fair to assume," he asked, "that one of the first upward movements will be in building construction? Clearly, if every activity in this direction were to start May 1 there would be a tremendous load on the railroads. In a large part of the United States material for construction work can be handled during the winter months." Mr. Aishton asks why building materials, the thousands of cars of fertilizer used on the farms, materials used by the railways in maintenance work, etc., should not be shipped now and avoid the uncertainties of delays due to an overburdened transportation machine.

In the opinion of Charles H. Markham, president of the Illinois Central "there is every reason to believe that the spring will bring a heavy revival of business following the winter slump. Every shipper will do well to make a study of his needs for the coming year and arrange his transportation demands in such a way that the movement will be facilitated."

In addition to these general conclusions, statistics on the various activities of the railroads during 1920 were compiled and as these are of close interest to all railway men, we are presenting below an abstract of the more important features appearing in this special issue.

NEW LINES CONSTRUCTED AND LINES ABANDONED

During 1920 only 314 miles of first track were completed as compared with 686 miles in 1919, while the total completed mileages (first, second, third and other multiple track) for the two years were 414 and 1,136, respectively, so the 1920 figure is only about one-third of what was considered last year as a record for low mileage. The most important decrease, however, or at least the one having the most bearing upon the operation efficiency of the roads, was that concerned with the construction of second, third and other main track. For second track this fell from 681 miles in 1918 and 405 in 1919 to 91 for 1920. The decrease in other main tracks was equally as marked. In Canada, 305 miles of new lines and 32 miles of second track were built, or a total of 337—but very little less than that for the United States. While lower than the 442 miles of 1919, it indicates a resumption of the policy of expansion which the Canadian roads have been following in tapping and building up new sections of the country.

The largest mileage of new construction was on the Government Railway of Alaska, which completed 37 additional miles. The next in size was the mileage completed by the Cisco & Northeastern and the Kingling, Eastern & Gulf with 38 and 26.6 miles, respectively, the total of the two—54.60 miles—comprising practically the entire mileage of new lines for the state of Texas. Texas with 54.90 and California with 54.74 miles were the only states, comparatively speaking, with any outstanding new track. The construction of new lines in these two states was a result of the development in the oil fields, the need for which outweighed other financial considerations, such as high building costs. At the present time little new mileage is being started or is now under way, that in prospect being in the main short extensions or branch lines. In Canada there are numerous branch lines under way ranging from 25 up to 135 miles in length. Second and other multiple track fell as stated to a total of about 91.82 miles, of which about 70 per cent was contained in the two states of Illinois and Ohio and built chiefly by the Illinois Central and the Cleveland, Cincinnati, Chicago & St. Louis in short sections. The maximum length on any one section of double track work was 13 miles.

Practically no new work of any magnitude was inaugurated during 1920, work being in general limited to only such facilities as were absolutely needed to conduct operation. This result is evidenced by the number of small improvements varying from \$100,000 to \$200,000 in cost and covering such work as additions to engine houses, yards and freight house extensions, etc. In regard to bridges little was done outside of making needed repairs and strengthening existing structures for the use of heavier power. Grade separation, grade reduction, passenger terminal work, etc., has likewise suffered and outside of some projects carried over and a few exceptions practically nothing has been done.

In 1920, 713 miles of line were abandoned for operation in the United States, 24 miles more than in 1919, but

what is more to the point, some 400 miles more than was constructed during the same period. In other words, the lines abandoned exceeded the new construction in the ratio of over two to one. Of the total mileage abandoned for operation, slightly over 239 miles were given up completely, the equipment sold and the lines taken up or junked. Of the remainder, approximately 474 miles, operation was discontinued either permanently or temporarily and in many instances petitions have been made to dismantle the roads so concerned.

THE CAR AND LOCOMOTIVE RECORDS

During 1920 the number of freight cars on domestic orders was 84,207 and a production of 60,955, while foreign orders totaled 21,462 cars. Passenger car orders showed a substantial increase over 1919, being 1,780 for domestic use and 313 for export. The actual production of passenger cars was 1,272, approximately the total amount of the orders. Locomotive orders for the United States were 1,998 for domestic and 907 for export, making a total of 2,905. Summarized, the production for domestic use was 60,955 freight cars, 1,272 passenger cars and 1,857 locomotives. Canadian roads ordered 12,406 freight cars, 275 passenger cars and 189 locomotives.

It is of interest to note in connection with the above figures, that there were only six weeks during 1920, when there was not a serious shortage of cars, yet but few cars were ordered. In contrast to this during the serious and prolonged shortage in 1905-1906 orders were placed for 650,000 cars, while in the four years from 1917 to date, a period of equipment shortage, the orders aggregated only 309,406, making a total for four years of less than one-half of the number ordered in 1905 and 1906.

SIGNAL CONSTRUCTION DECLINES

Only 515.2 miles of block signals were completed in the United States during the past year, of which all but 1.7 miles consisted of automatic blocks. Canadian mileage was very low, being but 8.3 miles. Some of this mileage represents new construction, some reconstruction and a part consists of manual block changed to automatic. Compared with 1919, construction work of this character has shown a decided drop and compared with previous years the change is still more marked. In 1919 a total of 979.4 miles of automatic block and 1,007 miles of manual block was constructed. Since 1908 the mileage of automatic block signals installed has been, with the exception of 1919 already mentioned, from two to five times that for the year just closed. The proposed new work for 1921, so far as ascertained, includes about 398.7 miles of automatic block signals in the United States and 43 miles in Canada. In regard to interlocking, a decided slump also occurred, the number of plants built or rebuilt during the year being but 45, of which two were in Canada, while in the year previous a total of 157 were built or rebuilt, of which only four were in Canada.

VALUATION WORK

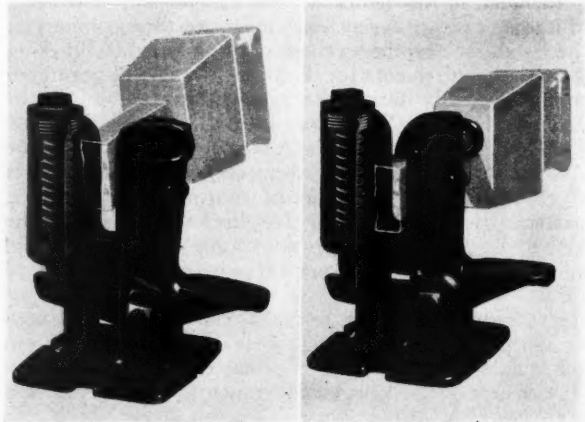
The two outstanding developments in valuation work in 1920 were the decision of the United States Supreme Court in the Kansas City Southern case wherein the Interstate Commerce Commission was directed, in accordance with the Valuation Act, to ascertain and report "the present cost of condemnation and damages or of purchase in excess of present value" of common carrier lands and the recognition of valuation as a basis for the returns to the carriers under the Transportation Act. During the year field work was completed in all districts not completed in 1919, with the exception of the Eastern district, and it is expected that this will be completed late

in the coming year. No final valuations have as yet been handed down, though in addition to the 55 tentative valuations and preliminary engineering and land reports served in 1919, separate engineering reports and land reports have been submitted informally to 41 Class I roads and 19 Class II roads. In the case of the reports and tentative valuations first handed down it is of interest to see that the aggregate cost of reproduction new plus the present value of land was \$3,203,782,543, while the investment in road and equipment as of the date of valuation was \$3,158,275,156, an excess of \$45,507,387.

REDUCING THE LOSS FROM RUN-THROUGH SWITCHES

EVERY roadmaster has his troubles with run-through switches which recur almost constantly in yards and terminals. Because of the expense in broken parts and the labor of track forces required to restore the damage done, various means have been devised from time to time for reducing or entirely avoiding the destructive effects of such occurrences. One of the more recent of these developments is the double automatic switch latch manufactured by the American Valve & Meter Company, Cincinnati, Ohio, which is said to have saved 90 per cent of the expense incident to the running-through of switches on one road which has kept accurate records.

These switch latches are made for use on the "Yardmaster" switch stands manufactured by this company,



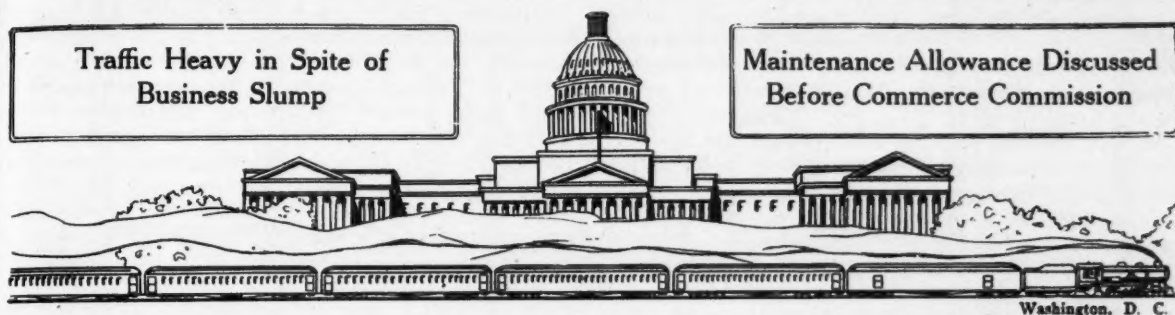
The Latch in the Open and Closed Positions

but will fit any parallel-throw switch stand in which the distance from the top of the tie to the bottom of the lever when in the closed position is $2\frac{1}{4}$ in. or more. The illustrations show the character of this automatic switch latch which receives the lever of the switch stand in the same manner as an ordinary latch. It is only when a switch is run through that the upward pressure of the switch stand lever causes the keeper of this latch to release automatically. It requires an upward pressure of 50 lb. on the latch to produce this release, which is accomplished by the compression of a spring enclosed in a case at one side of the latch. After the lever has passed out of the latch the spring expands, thereby returning the keeper to its normal position. In ordinary operation of the switch stand the latch is opened by the use of a foot-treadle, which is clearly shown in the photograph. By the application of a padlock to this latch it becomes a positive latch, the same as any other. One advantage to which attention has been drawn is that the running-through of a switch equipped with these latches turns the target and switch lamp so that the fact that the switch has been run through is immediately apparent.

THE RAILWAYS AND THEIR PUBLIC RELATIONS

Traffic Heavy in Spite of
Business Slump

Maintenance Allowance Discussed
Before Commerce Commission



IN SPITE OF the business slump during the past two months, it is now clear that all records for the volume of freight handled by the railroads in a year have been broken in 1920. For the 10 months ending with October the number of ton miles of revenue and non-revenue freight was 373,526,000,000, as compared with 325,580,000,000 in the corresponding period of 1919. In October the railroads handled 42,562,685 ton miles of freight, as compared with 40,166,000,000 in October, 1919. This represents with one exception the largest volume of freight ever handled by the railroads in a month. In August, in which month a large volume of freight was offered to the railroads to beat the new freight rates which went into effect on August 26, the ton mileage was 42,656,000,000.

The average mileage per freight car per day in October, 28.5 miles, not only established a new record for the year, but was greater than has been recorded for any month since May, 1917, when the railroads had just started their drive to increase the efficiency of freight car performance just after the United States entered the war. The average load per car, 29.9 tons, was slightly less than for September, when it was 30.1 tons.

Very little progress has been made, however, in reducing the percentage of bad order cars, which was 7.3 for October, or of locomotives. On December 1, 17.2 per cent of the locomotives were held out of service for repairs requiring over 24 hours and 6.2 per cent for repairs requiring less than 24 hours.

From October 31 to December 11 this year the total car loading was 5,215,761, as compared with 4,780,052 in 1919 and 4,935,299 in 1918. The weekly car loading has fallen off from 1,010,000 cars in the week of October 23 to 834,897 in the week of December 11.

The car shortage, which on September 1 amounted to 147,000 cars, has given way to a considerable surplus of equipment, which for the week ending December 8 amounted to 74,195 cars, largely box cars, while there were still shortages amounting to 14,945, representing largely a demand for coal cars in the eastern districts. The Interstate Commerce Commission has cancelled all of its priority orders giving preference in car supply to coal shipments.

OCTOBER EARNINGS

The October earnings of the railroads, as reported by the Interstate Commerce Commission, like the September earnings, failed to make as satisfactory a showing as had been generally expected from the increases in freight rates. While there was a net operating income in September of \$75,310,000 and in October of \$86,455,000, in order to earn a 6 per cent return the roads should have earned about \$109,000,000 in September and about \$112,000,000 in October, according to the proportion of a year's business which in the past has been handled in those months. The unsatisfactory showing of net operating in-

come in October was in part attributable to the increase in expenses, but also to the failure to realize the full effect of the rate increase. Total operating revenues were \$642,000,000, an increase over October, 1919, of \$132,000,000, or about 25 per cent, while operating expenses were \$526,000,000, an increase of \$120,000,000, or 29 per cent.

The maintenance of way and structures expenses in October were \$90,895,381, as compared with \$72,383,533 in October, 1919, and for the 10 months' period they were \$880,672,740, as compared with \$647,648,521 in 1919.

HEARING ON MAINTENANCE ALLOWANCE

A hearing was held before the Interstate Commerce Commission at Washington on December 4 on the application of Paragraph 3 of Section 209 of the Transportation Act relating to the allowance for maintenance to be made during the six months' guaranty period from March 1 to September 1 in computing the net operating income guaranteed to the carriers. Briefs had been filed with the commission on this subject by the Association of Railway Executives and the Railroad Administration and the arguments made at the hearing were in general along the lines followed in the briefs. Arguments were made on behalf of the railroads by Alfred P. Thom, general counsel of the Association of Railway Executives, and by S. T. Bledsoe, general counsel of the Atchison, Topeka & Santa Fe, chairman of the adjustment committee of the Association of Railway Executives, while the argument on behalf of the Railroad Administration was made by J. C. Davis, its general counsel.

The principal contention of the railroads was that the maintenance allowance, as well as the director general's obligations to maintain the railroads during the period of federal control, should be based on the sum necessary to produce the physical equivalent of the maintenance work performed during the test period, while the Railroad Administration argued that the provisions of the standard contract which also govern the maintenance allowance for the guaranty period, provide for an accounting test of the sufficiency of the expenditures made.

Mr. Thom made the contention that the engineering test should be applied so far as practicable and that the money test should be applied to items as to which the actual physical reparation cannot be definitely measured. The railroads also contended that the equation of expenditures for maintenance to represent increases in the cost of labor, materials, etc., should also be applied to depreciation.

Mr. Davis, on behalf of the Railroad Administration, said that the differences between the railroads and the administration as to the interpretation of the maintenance provisions of the standard contract represent a possible difference of \$1,000,000,000. The gross amount asked of the Railroad Administration by eight large railroads whose claims are now under consideration is \$203,943,-

000, of which \$138,000,000 represents claims for maintenance, a great part of which depends upon the construction placed upon the word "cost" instead of "price" in the standard contract. Mr. Davis pointed out the great difference in maintenance standards and conditions on different roads and the difficulty of applying the engineering test to maintenance.

He said that one railroad in Mississippi had based its claim on an affidavit of an expert who had been over the line at the time the road was taken over by the government and who went over it again immediately after the termination of federal control and stated that it would cost about \$3,000 a mile to put the road in the condition in which it was taken over, or a total of \$1,800,000. He also referred to the wide differences in the claims made by the different railroads as to the inefficiency of labor during the period of federal control. He said that perhaps because of the different conditions during the period of federal control a railroad did not need the same quantity of rail as was placed on it during the test period, but needed something else and it was necessary to use the accounting test to determine whether the expenditure of money for some other purpose was the equivalent of the expenditure which might have been made for rail.

RAILROADS SEEK TO COLLECT GUARANTY

Oral arguments were presented before Chief Justice McCoy of the Supreme Court of the District of Columbia on December 16 and 17 on the petition of the Grand Trunk Western for a mandamus to require the Secretary of the Treasury to honor a certificate of the Interstate Commerce Commission for \$500,000 on account of this road's guaranty for the six months from March 1 to August 31. This is a test case and a decision would involve nearly \$400,000,000 due to the railroads. J. H. Covington, appearing for the railroad, contended that if the Secretary of the Treasury can find refuge in the decision of the Comptroller of the Treasury, who has held that the Treasury cannot honor certificates for anything less than the finally determined amount of the guaranty, he can defy Congress and the courts together. No decision by the comptroller, he argued, could turn a merely ministerial duty of the Secretary of the Treasury into one for the exercise of his discretion and the law providing for payments to the railroad companies on certificates of the Interstate Commerce Commission gives the discretion to the commission and makes the signing of a warrant on such certificate a purely ministerial function of the secretary. Assistant United States Attorney Mason represented the Treasury Department and contended that the decision of the comptroller is binding on the Secretary of the Treasury and that the law provides for only one warrant after a final audit of the guaranty.

BOARDS OF REFEREES MAY CONSIDER MAINTENANCE CLAIMS

The board of referees appointed by the Interstate Commerce Commission to report to the President what would be just compensation for the use of the property of the Western Pacific during federal control has made a formal ruling that it has jurisdiction over all claims arising out of federal control, and is not confined to the question of the annual rental, thereby overruling an objection by the Railroad Administration to the introduction of testimony to prove under-maintenance.

CLAYTON ACT IN FORCE

Section 10 of the Clayton act, which became a law on October 15, 1914, but which has been rendered inoperative because of various extensions of the effective date, went into effect on January 1 because President Wilson vetoed a bill passed by Congress to amend Section 501

of the Transportation Act by extending the effective date of Section 10 of the Clayton act for another year.

A substitute for Section 10 of the Clayton act designed to accomplish the same purpose, but in a workable way, drafted by Alfred P. Thom, general counsel of the Association of Railway Executives, has been introduced in Congress by Senator Frelinghuysen and Representative Esch, and it has been planned to hold hearings on the bill. The action of the President in vetoing the extension will probably hasten action on the substitute. Section 10 provides that carriers shall not have dealings in securities, supplies or other articles of commerce or make contracts for construction and maintenance to the amount of more than \$50,000 in the aggregate in any one year, with another corporation, firm, partnership or association when the common carriers shall have upon its board of directors or its president, manager or as its purchasing or selling officer or agent in the particular transaction, any person who is at the same time a director, manager or selling officer of, or who has any substantial interest in such other corporation, firm, partnership or association, unless such dealings shall be with the bidder whose bid is the most favorable, to be ascertained by competitive bidding under regulations to be prescribed by rule or otherwise by the Interstate Commerce Commission. The Interstate Commerce Commission has prescribed regulations in accordance with the law, which has been suspended from time to time, but which went into effect when the law was made effective by the President's veto.

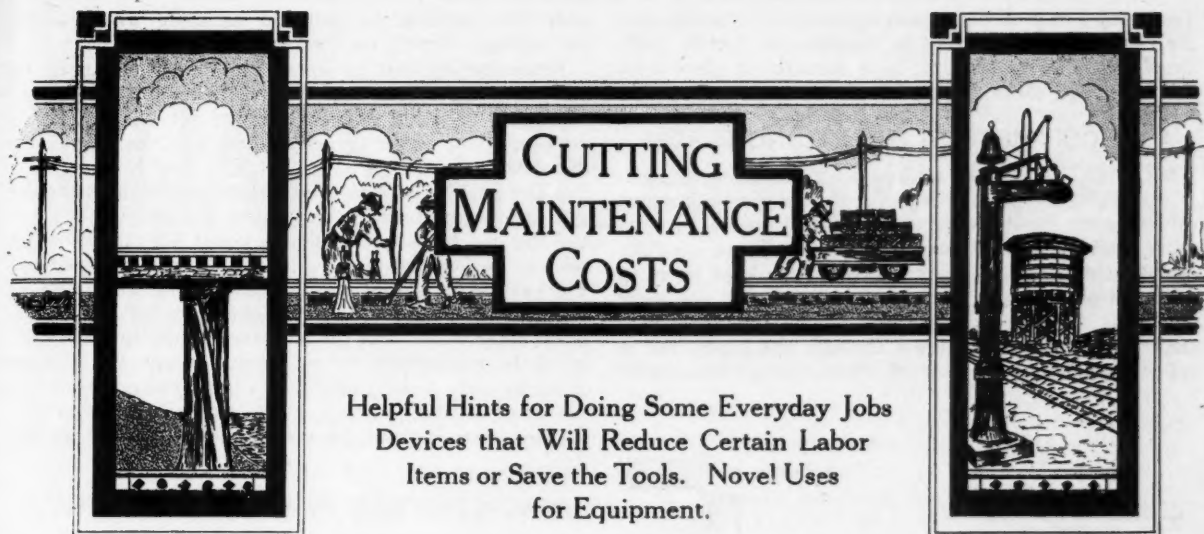
WATER SOLUBILITY A NECESSARY PROPERTY OF WOOD PRESERVATIVES*

THAT ANY substance to be an effective wood preservative must be soluble in water at least to the extent of producing a toxic water solution is the basis of a theory now being developed at the U. S. Forest Products Laboratory. It would seem reasonable to expect that any material which is poisonous enough to kill an organism of any kind must necessarily be soluble in the body fluids of that organism; and the chief body fluid of timber-destroying fungi and wood borers is water. With very poisonous materials this solubility need not be great; in fact, 1 part in 1,000,000 may be sufficient if the material is poisonous enough.

Wood preservatives now in use are of two distinct types—inorganic salts, such as zinc chloride, which are very soluble in water; and oils, such as the creosotes, which are generally considered to be insoluble. The solubility of creosote is usually considered so slight as to be neglected, but experiments indicate that certain constituents of creosote are sufficiently soluble in water to make it poisonous for wood destroyers. Creosote oil may, therefore, be considered as consisting of two groups of compounds, one of these being sufficiently soluble in water to render it toxic, the other insoluble in water and hence not toxic. The non-toxic oils act as a reservoir for the toxic oils and feed them slowly to the moisture in the wood.

The difference between oil preservatives and inorganic salt preservatives, as far as this theory is concerned, is in their method of retaining the reserve supply of poison. Zinc chloride has no reserve supply, all the material being soluble in the usual amount of moisture present in air-dry wood. Sodium fluoride may have a reserve supply in the form of solid crystals, if applied in a saturated solution. Creosote oil may have a considerable reserve supply stored in the oil itself, this supply being fed to the wood as needed.

*Technical Note 114, Forest Products Laboratory, U. S. Forest Service, Madison, Wis.



Helpful Hints for Doing Some Everyday Jobs
Devices that Will Reduce Certain Labor
Items or Save the Tools. Novel Uses
for Equipment.

A METHOD FOR TAKING OFF PAINT

A SIMPLE means for removing old paint from steel structures is afforded by concentrated powdered lye dissolved in hot water, with lime added to make the solution thick enough to spread evenly. The mixture should consist of 1 lb. of lye to 3 qt. of hot water. The solution, which is applied as soon as it is mixed by means of a brush, should be allowed to remain on the surfaces to be cleaned until it is almost dry. If removed at this time it will take the paint with it unless the paint is very old and thick, in which case a second coat of the solution is usually effective. The metal should be thoroughly washed with a solution composed of $\frac{1}{2}$ lb. of sal soda dissolved in 2 gal. of warm water before applying a new coat of paint. After the soda solution has been applied, the surface of the metal should be wiped or warmed until thoroughly dried. The American Machinist, from which this information was taken, also states that a method similar to this is in use by the United States Coast Artillery for cleaning the exterior portions of the big guns and their carriages.

THE RENEWAL OF ASH PIT WALLS IN SECTIONS

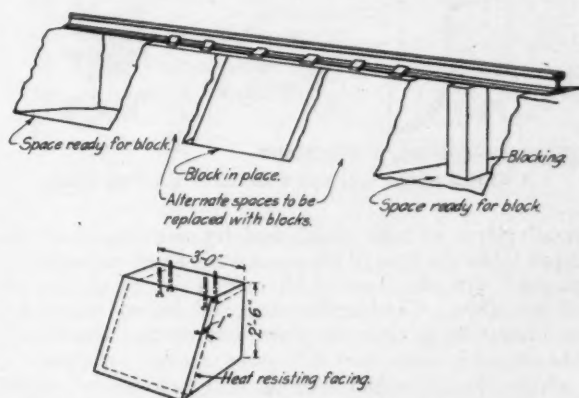
By J. M. FOOTE

THE MAINTENANCE engineer is frequently required to renew the concrete underneath the rails at ash pits, due to damage by hot cinders about the water line. This is usually a troublesome problem and gives rise to serious complaints from the mechanical department forces if terminal operations are interfered with. It is sometimes the practice to close one end of the pit to traffic, thus interfering seriously with the usual movement of engines to the house, or if traffic is not interrupted the rail is blocked up above the new concrete in some cases. In the latter case the new concrete is frequently made to bear the weight of engines before it is properly seasoned and as a result the plates and bolts work loose in the wall and the concrete close under the rail disintegrates rapidly under heat.

On the Erie the practice has been to renew the wall with blocks of concrete, which are allowed sufficient time to become seasoned before being placed. The old concrete is removed and the new blocks installed in alternate sections. The remaining sections are then removed and the work is completed without any interference to traffic,

with concrete which is properly seasoned and having anchor bolts which live up to their name in every way.

This method combines all the desirable features of non-interference with traffic, ability to secure a superior grade



How the Wall Was Cut Out in Sections and the New Concrete Blocks Inserted

of concrete, minimum time for installation, positive anchor of rail to concrete, sound bearing of plates on wall, winter installation if necessary, mixing of concrete under cover, minimum interference of men and materials with ash pit operation and the multiple use of forms.

PROTECTING ADZE HANDLES FROM DAMAGE

C. S. LUSK

Section Foreman, Erie, Alfred Station, N. Y.

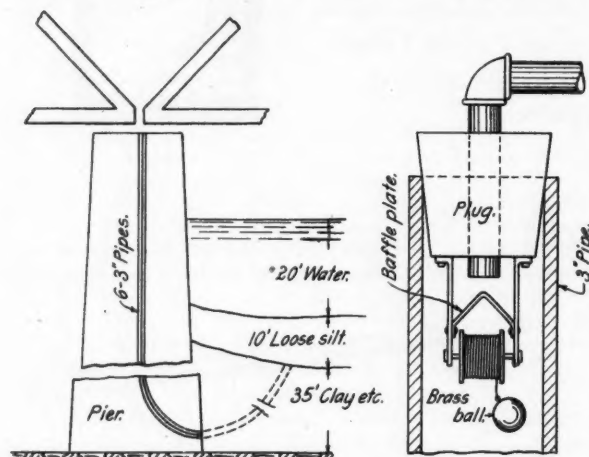
WHEN ADZING ties to form a level seat for the rail or tie plate in a case where the rail cannot be removed, the adzing must be done ordinarily with the rail raised only two inches above the top of the tie. To do adzing under such circumstances, it is necessary to hold the handle of the adze at such an angle that it is brought in contact with the ball of the rail. The result is that it is difficult to do the work properly without bruising the handle badly if it is not protected.

I have found it entirely practicable to overcome this difficulty by covering the lower portion of the adze handle with a piece of scrap air hose about five inches long.

To do this I rasp off the square corners of the handle near the eye of the adze so as to roughen the handle sufficiently to hold the piece of hose securely in place with the lower end about $1\frac{1}{2}$ in. above the eye.

A UNIQUE METHOD OF LEADING CABLES

IN CONSTRUCTING a large bridge spanning an eastern river, provision was made for carrying numerous cables under the draw, or open span, by means of conduits leading down through the piers. These conduits consisted of six 3-in. pipes curved at the base so as to open out on the sides of the base of the pier, and were placed as the pier was constructed. When completed snake wires were run down through the pipes, but it was found impossible to work them through because of



A Sketch of the Pier and a Detail of the Pipe Plug.

small pieces of rock which had become lodged in the pipes, while the base of the pipes were found to be solidly plugged with the clay which overlaid the rock bottom of the river. Considerable time and money was spent in attempting to clear the pipes without any appreciable success, and finally the cables were run down the outside.

After the cables had been cut once or twice by vessels bumping into the timbers, a method was devised which effectively cleared the conduits. A heavy plug was made through which a pipe was run carrying an elbow and a connection. This plug was blocked securely in position so that it would not be blown out, the pipe connected up to the hydraulic system of the bridge and a pressure of 1,800 lb. per sq. in. introduced. As soon as the pressure in the pipe had had enough time to build up, a dull boom was heard and considerable disturbance of the water in the river was noted a short distance from the pier. This showed that the pipe had been blown out and also that an opening had been blown through the stratum of the more or less hard clay, etc., covering the river bottom.

Snake wires were again introduced, but owing probably to the irregularities of the opening through the clay it was again found impossible to work them through. Divers were called in to locate the ends, but as there was from 30 to 35 ft. of this semi-compacted overburden they could do practically nothing. A plan was eventually devised. By means of a hanger a small reel carrying strong fish cord was fastened to the old pipe plug. A light-weight, hollow brass ball was attached to the free end of the cord and the pipe attached to the feed water pump so that a circulation of water could be maintained through the pipe and to the outside river water. A baffle

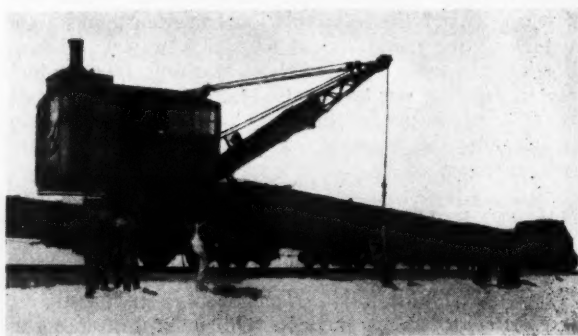
plate was installed so that the incoming water would not impinge directly on the reel.

Remembering that in somewhat similar instances an electric company had carried a line through a pipe by attaching it to a rat, after which the rat was placed in the pipe and a weasel turned in after him, the man doing the work proceed to a fish shop, where he bought a live and healthy eel which was made fast to the fish cord and ball by means of a large hook run through its tail and the end bent over so that it could not escape. The eel was then placed in the pipe and the water turned on. The eel naturally followed the flow of the water and in a short time the glint of the bright brass ball was noted in the river water. As the buoyancy of the ball was sufficient to overbalance the eel slightly it was able to stay down for only a short period at a time, and on about the second or third appearance it was scooped up with a net, the line removed and the connection established as desired.

USING A DITCHER IN SCAVENGER SERVICE

A MOST UNUSUAL application of maintenance of way equipment was made by Union Pacific track forces when confronted with an emergency task that promised to be both arduous and expensive. A freight train on the Colorado division, while running through a blinding snowstorm between Iliff, Colo., and Proctor, smashed through a herd of cattle which had wandered onto the track. The result was the killing of 155 head of cattle in a distance of five miles. The work of picking up such a large number of dead animals, strung out over such a length of line, looked rather formidable until someone suggested that it would be a good job for one of the railroad's ditchers.

A work train consisting of an American railroad ditcher mounted on its flat car and a number of gondolas was



Ditcher Loading Carcasses.

made up at La Salle, Colo. For this work the dipper and dipper arm were removed and a chain clipped to the end of the hoisting line. This chain was hooked around the animal's leg and the ditcher hoisted the carcass into the gondola. The ditcher boom was not long enough to deposit the dead animals in the farther end of the cars, but the ditcher operator solved the problem without switching the crane to the opposite ends of the gondolas by giving each carcass a quick swing which landed it in the far end of the car. In this way each gondola was loaded to capacity.

The entire operation of going out to the scene of the accident, loading the 155 dead animals, running back and unloading them at the "boneyard" was completed in about three hours. This was done under the direction of C. F. Hideman, roadmaster, Sterling, Colo.



THIS IS THE initial appearance of a new department of the *Railway Maintenance Engineer* which we believe will become one of the most valuable as well as interesting features of the paper. The object of this department is to provide a clearing house for the solution of those problems which the reader encounters in his routine maintenance of way work. We believe that the *Railway Maintenance Engineer* can perform a real service for its readers by providing this opportunity for the discussion of the troublesome questions that are bound to arise from time to time in the daily work of every officer and employee. With a view to making this feature of the paper of greatest value, we solicit the co-operation of our readers, not only in submitting those questions or problems for solution which are troubling them, but in contributing answers to the questions which have been presented and thereby coming to the assistance of their fellow-employees. To permit these answers to be prepared and submitted, the questions will not be answered until the second issue following their presentation in the paper. It is necessary to allow this interval in order that sufficient time shall elapse for the paper to reach the reader in distant portions of the country and for him to prepare his answer and send it to the editor. Furthermore, the editors cannot presume to possess so extensive a knowledge of all branches of railway maintenance as to enable them to answer authoritatively any or all questions that may be submitted, but it will be their endeavor to find someone who is competent to give a legitimate reply if answers are not submitted voluntarily by the readers.

Any question concerning any practical problem encountered in the ordinary maintenance of way work, particularly in track, bridge, building and water service work, will be considered. Answers must reach the editor not later than the 18th of the month preceding the date of the second issue after the one in which the question is published in order to appear. Address all questions or answers to the Editor, *The Railway Maintenance Engineer*, 608 South Dearborn street, Chicago.

THE FOLLOWING QUESTIONS WILL BE ANSWERED IN THE FEBRUARY ISSUE

- (1) How can the higher track shims be braced to insure complete safety?
- (2) What is the best way to cut off a reinforced concrete pile?
- (3) When and under what conditions is it advisable to paint the exterior of buildings?
- (4) What can be done to correct a track tank valve which persists in getting out of order because of the pounding that occurs when it is closing?

THE FOLLOWING QUESTIONS HAVE BEEN SUBMITTED FOR ANSWER IN THE MARCH ISSUE

- (1) How may piped rails in the track be almost certainly detected through visual inspection?

- (2) Should trestle bridge stringers be bolted to the caps?

- (3) What can be done to avoid dry rot in floor timbers of a building set close to the ground but not provided with a basement?

- (4) How can pounding in a pump be prevented?

Answers to several questions already submitted appear below.

PAINTING STEEL BRIDGES IN WINTER

Is it safe to paint a steel bridge in cold weather?

It is entirely safe to paint steel bridges in cold weather if the work is done under the direction of a skilled painter with sufficient experience to know how the work should be done and the particular conditions to guard against. The one condition to avoid in winter painting on metal is moisture on the surface. When the steel is colder than the air, moisture will collect on the surface in the same way that it does on the warm side of a window pane in winter. This condition will be more severe on a damp day or in damp place away from the sun or enough wind to dry out the moisture. It also occurs when the weather turns suddenly warmer after a cold spell, since the steel will warm up more slowly than the air.

Paints applied on a dry surface in cold weather will last as long, if not longer, than paints put on during extremely hot weather, but the work must be done right and the materials must be pure and intelligently manipulated to secure a consistency that will insure proper penetration and adhesion. Above all, the surface must be dry, so a foreman must be careful to avoid painting on unfavorable days or on structures subject to especially damp conditions.

CHARLES ETTINGER, General Paint Foreman, Illinois Central, Chicago.

LAYING FLOORS DIAGONALLY

Why is it preferable to lay some floors diagonally?

A sub-floor of boards or planks six inches or eight inches in width tends to shrink and warp. If the sub-floor is laid at right angles to the joists, so that the joints in the sub-floor and the finished floor are parallel, the shrinkage and warping of the sub-planking will tend to cause wide joints in the finished floor over each joint in the sub-floor and also cause the finished floor to warp in the same manner as the sub-floor.

If the sub-floor is laid diagonally the opening of joints in the sub-floor cannot affect the joints in the finished floor and as the latter can rest only on the high portions of any warped sub-planking, the finished floor will have a much better surface than when it can follow all of the irregularities in the sub-floor. This method of laying also tends to level out the warping of the sub-planking and reduces the tendency of the floor to squeak.

PETER AGAARD, President, T. S. Leake Construction Company, Chicago.

PREVENTION OF HEAVING AT ROAD CROSSINGS

How can trouble from heaving in the vicinity of road crossings be modified or avoided?

Heaving in winter in the vicinity of road crossings may be greatly modified by good drainage, together with sound ties and especially the absence of joints in the rails throughout the extent of the crossing and for at least five feet on either side. The ties must not only be sound, but must have complete tie plate protection also. With these auxiliary requirements met and a thorough cleaning of the ballast before winter, in the ditches as well as in the tie cribs and beneath the ties, making sure that an outlet is afforded the drainage, most if not all of the trouble which occurs from frost conditions around road crossings will be avoided.

W. F. RENCH.

PATCHING LEAKS IN WATER MAINS

What is a good way to patch a leaky joint or break in a cast iron water main?

The patching of a leaky joint is one problem, the repair

of a break in the pipe itself is another one. If a joint leaks, the first thing to do is to find out the cause. Usually this is poor workmanship, the failure to do the caulking properly or not doing it at all, but in some cases a leak may be the result of pounding, vibration or settlement of the pipe, in which case this cause can be corrected before attempting to stop the leak. Usually this can be done by re-caulking the joint with the addition of cold lead. Lead wool or leadite will be found most convenient for this purpose. If this does not stop the leak it will be necessary to cut out the old joint entirely, pour a new one and caulk it thoroughly.

If there is a break in the pipe in such a way that the ends of the pipe are still in good condition, the break can be repaired best by the use of a split sleeve (two half pipes made with flanged joints on the sides and bell ends). After shutting off the water and draining the pipe, this split sleeve may be placed around the old pipe and securely bolted up, after which a lead joint is poured and caulked at each end.

M. D. MILLER, President, Railroad Water & Coal Handling Company, Chicago.

Can Steel Rails Be Improved?*

BY C. W. GENNET, JR.

Manager Rail Inspection, Robt. W. Hunt & Co., Chicago

PUBLISHED records indicate that one rail out of every 800 laid may be expected to fail in the first five years of service. Although such figures may seem appalling, solace is found in the fact that only about half of the total failures are what may be termed of a dangerous type. The others consist mostly of defects occurring in the head of rails, which, as a rule, can be detected easily by careful surveillance and removed prior to the development of further trouble. Notwithstanding what the types of failures may be, or how prolific they may be, questions of specifications and manufacture are important and deserving of the fullest thought.

There is little use in threshing over the subject of specifications, except in a very general way. My criticism of most rail specifications is that they are too broad in certain features and too narrow in certain others, with the result that both manufacturers and consumers suffer aggravating incidents that could easily be prevented. Manufacturers frequently find it difficult to get good steel accepted quickly, and, on the contrary, railroads are frequently bound to accept what unquestionably ought to be rejected outright.

The physical tests do not, as a rule, go far enough to protect against bad or unsound rails being accepted and laid in the tracks, only to be replaced perhaps after a short service. Testing two or three pieces of rails to represent as many as 200 made from perhaps 50 ingots, each possessing marked individuality, even though from the same heat, is incompatible with the tests prescribed for many other products on whose use hinges no important question of life. The proposed abandonment of the drop test, for years recognized as a standard test for brittleness, and the plan of covering this feature by resort to a measurement for ductility obtained under difficult and uncertain conditions, is regrettable. Granting the importance of ductility for rail steel, the imposition of arbitrarily determined limits for it, the matter of measuring it satisfactorily except in the laboratory, and finally the question of accepting or rejecting rails whose ductility varies by a

hundredth part of an inch, is, to my way of thinking, positively dangerous. Would it not be better to waive the question of the ductility of rails entirely, as it was so long an unknown thing, and to devote more study to the definition of "interior defects" and such positive methods for detecting them as would permit of rejecting those rails whose test piece fractures show unmistakable signs of segregation?

SOME QUESTIONS AS TO MANUFACTURE

I regard the manufacture and rolling of rail steel as of more importance than that of any other steel product, and conditions emphasize the necessity of making thorough studies of the various features of present day methods. Such studies must frequently be based not only on the manufacture itself but on the story that the rails in service may tell later. Records for many subjects are already in hand and time and work are merely required to afford definite information on questions of great value to both railroads and manufacturers. Literature is very weak on many of the subjects that ought to be investigated and discussed, and among the many questions that can be raised I suggest some of the following pertinent of modern practice and especially appropriate, therefore, for original research and study.

1. Are rails made of steel by the continuous Talbot furnace process comparable with those made by the straight open hearth method? In the continuous process the furnace is seldom emptied but 100 tons or so of steel is tapped every 2 hours, as against the 10 hours of time required to make an equivalent heat in a regular furnace. Is the steel from the rapid working Talbot furnace sufficiently free from oxides and other impurities to afford good, sound rails, and how can such a question be proven quickly?

2. What effect, if any, on rails has steel made by the duplex process, wherein highly oxidized metal is added to the open hearth furnace, sometimes very soon before tapping? How can rails rolled from steel containing excessive amounts of impurities be detected?

3. What effect on rails is produced by recarbonizing

*Abstract of a paper and the discussion following as presented before the Western Society of Engineers, Chicago, on November 18, 1920.

the steel in the ladle with coal or coke and then adding cold deoxidizers to the ladle? What is the real effect produced by holding a ladle of steel prior to casting the ingots to permit of time for the chemical reactions to settle?

4. What is the effect on rails rolled from ingots cast with running stoppers and sometimes without any control by the ladle operator? How does the size of the nozzle, pouring temperatures, and time required to cast the ingots of a heat influence rails?

5. How soon after casting ingots should they be charged into the soaking pits in order to assure a minimum of piping and segregation? What effects are produced by delays in charging the ingots to the pits promptly, and what is the effect of chilling the outside of the ingots unduly and rapidly?

6. How long a time and under what conditions of gas and air regulation should ingots remain in the soaking pits? What kind of control of the pits is best to insure against overheating or burning the ingots? What is the effect of rolling rails from ingots one side of which has been heated so hot as to show a bright white spot significant of overheating?

7. What effect on rails has different rates of blooming the ingots? In some cases 8 in. by 8 in. blooms are made from ingots in 9 passes and in other cases in 20 passes. Some mills work rapidly and others slowly; does this produce any difference?

8. What effect on the grain structure or the life of rails is produced by increasing the number of passes, or work given to the steel, when the ingots are rolled into rails? One mill makes a rail from a 19-in. square ingot in 15 passes, while another mill makes the same rail from a 24-in. square ingot in 29 passes. Has the average rate of reduction per pass any effect on the life of rails?

9. What matters mostly influence the production of rails showing seams on the surface? Some heats are practically free from indications of seams, while on other heats rolled at the same time seams are abundant.

HOW TO RETURN EMPTY CEMENT SACKS

THE PORTLAND Cement Association has given no small amount of attention to the conservation of cement sacks, directed primarily to care in handling them on the job. As a further step in this direction some notes and instructions were issued recently that are designed to standardize practice in preparing the sacks for return to the cement mills.

Empty sacks are valuable property and should be handled carefully at all times. It is important that they should be made up into tight, strong bundles, and tagged with the best grade of linen tags, completely filled out so that each bundle in every shipment may be fully identified. All railroads recognize the importance of proper bundling and tagging and have rules providing that bundles which are not properly marked and bound shall not be accepted for transportation. The instructions given below are based on the railroads' rules and it is necessary to follow them for this reason, as well as for your own protection:

HOW TO BUNDLE SACKS

Lay the sacks flat in piles of 50 each.

Pass a wire or rope, 40 in. long, under each end of the pile, and lay a third wire or rope, 8½ ft. long, lengthwise on top of the pile. The rope must be at least 3/16 in. thick.

Bring the two short wires or ropes up over the pile of sacks and tie them tightly.

This will roll or double the sacks over the long rope.

Turn the bundle over. Bring the ends of the long rope around the ends of the sacks. Take hitches with the long rope around the two short ropes that have already been tied.

These hitches will keep the short ropes from slipping over the ends of the bundle.

Then cross the long rope in the middle; bring it around the middle of the bundle and tie tightly.

This will make a bundle that will stand rough handling. It will be light and convenient to carry, so that no one will be tempted to drag it. If the ropes are tied tightly, it will be next to impossible to pull any sacks out of the bundle.

It is a good practice to put one of your business cards, letter heads, or a tag with your name on it, inside each bundle, as this will enable the consignee to identify your property if the tag should happen to be detached.

HOW TO TAG BUNDLES

Use nothing but linen tags, preferably those furnished by the manufacturer to whom you are returning the sacks.

Fill out all the blank spaces on both sides of every tag.

Fasten the tag securely to the bundle with wire.

Prepay the freight.

Be sure that the amount of freight you pay is shown on the bill of lading.

Send to the company to whom the sacks are being shipped the original bill of lading and a letter stating how many sacks are in the shipment.

CHARGES FOR CONSTRUCTION EQUIPMENT

IT IS SOMETIMES necessary for engineers preparing estimates for a project, the cost of which must be borne by outside parties or some other railroad, to prepare estimates or statements of cost wherein it is necessary to include all possible items of expense which will be incurred. Under this head may be included depreciation and repair on equipment. It is for this reason that the following table prepared by the committee of the Associated General Contractors will be found of value. The table as given below covers only such items as are of interest to railroad men; the original list included many more. While the values given are tentative, it being the idea to obtain further data from members of the association, the table will be of assistance as indicating average values, particularly as very little information of this kind has been available previously.

Equipment:	Economical Length of Life in Years	Annual Repairs, Per Cent of Cap. Investment	Shop Repairs, Per Cent of Cap. Investment	Field Repairs, Per Cent of Cap. Investment
Ballast spreaders	8	6		4
Boilers, upright	6	25		5
Boilers, locomotive	8	16		4
Buckets, clam shell	6	6		4
Buckets, orange peel	6	7		6
Buckets, drag line	4	5		3
Compressors, portable:				
Steam	6	5		3
Gasoline	5	6		4
Electric	6	3		3
Concrete chutes	2	10		15
Derricks, wood	5	4		4
Derricks, steel	10	3		3
Dragline excavators:				
Steam	6	9		8
Gasoline	4	10		10
Electric	8	7		7
Engines, gas	6	8		8
Engines, steam	10	5		5
Hammers, riveting	5	6		4
Hoists, steam	10	6		4
Hoists, gasoline	5	8		6
Hoists, electric	8	5		3
Locomotive cranes:				
Steam	8	7		8
Mixers, steam	7	6		4
Mixers, gasoline	4	8		6
Motors	6	6		4
Pile drivers, track	10	5		3
Pile hammers, steam	6	7		3
Pipe, galvanized	3			6
Pneumatic concrete placing	5	4		8
Pumps, centrifugal d. c.	8	6		4
Pumps, piston d. c.	6	7		5
Pumps, pulsometer	10	2		4
Pumps, Emerson	10	2		4



THE AMERICAN WOOD PRESERVERS' ASSOCIATION

For the first time in its history, this association will meet on the Pacific Coast, plans now being practically completed for the annual convention, which will be held in the St. Francis hotel, San Francisco, Cal., on January 25-27, inclusive. A large number of the members of the association and others will take advantage of the opportunity to study the timber resources and methods of production in the Douglas fir and redwood areas of the far west. Those members of the association from the eastern states will leave Chicago by special cars or a special train via the Burlington-Northern Pacific on Saturday morning, January 15, with connecting cars from St. Louis and Kansas City, and will arrive at Seattle on Tuesday, January 18. The following two days will be spent in visiting the creosoting plants and lumbering operations in the vicinity of Seattle. Going to Portland on Thursday night, the party will spend Friday at the St. Helens, Ore., creosoting plant, studying the perforating and treatment of Douglas fir. That evening they will be the guests of the West Coast Lumbermen's Association at its annual dinner at Portland. On the following day they will visit a large lumbering operation near Portland. The party will leave Portland on Sunday evening, arriving at San Francisco Tuesday morning. Following the convention opportunities will be afforded those in attendance for the inspection of piling conditions in San Francisco harbor and also for a trip through the redwood forests of California.

The program in detail is as follows:

TUESDAY MORNING

- 10:30 a. m. Convention called to order.
Open business.

TUESDAY AFTERNOON

- 2:00 p. m. Report of Committee on Preservatives.
Paper—"Cresol, a Proposed Wood Preservative," by R. G. Smith.
Report of Committee on Utilization and Service.
Report of Committee on Track.
Paper—"Selection and Treatment of Douglas Fir Ties," by A. C. Pestel.
Report of Committees on Flooring and Paving.

TUESDAY EVENING

- Report of Committee on San Francisco Bay Marine Piling.
Paper on the Marine Borers of San Francisco Bay and the Biological Factors Governing Their Occurrence, by Dr. Charles A. Kofoid.

WEDNESDAY MORNING

- 10:00 a. m. Report of Committee on Treatment.
Report of Committees on Fir Ties and Blocks.
Paper—"Treated Lumber in Insulating Roofs of Moist Factories," by F. J. Hoxie.
Paper—"History of Wood Pipe and Some Data on Its Use," by E. F. Bartells.

WEDNESDAY AFTERNOON

- 2:00 p. m. Paper—"Experiments with Butt Treated Poles in California," by P. R. Hicks.
Paper—"Perforated Butt Treated Poles," by W. M. Leavitt.
Paper—"Wood Preservation as a Conservative Policy," by Walter Buehler.
Paper—"Description of Process Used to Treat Pile Butts in Place," by E. F. Hartman.

THURSDAY MORNING

- 10:00 a. m. Report of Committees on Pressure and Non-Pressure Treatment of Poles.
Closing Business.

TIE PRODUCERS' ASSOCIATION

The National Association of Railroad Tie Producers will hold its third annual convention at the St. Francis Hotel, San Francisco, January 27 and 28, immediately following the convention of the American Wood Preservers' Association. This convention marks the conclusion of a most successful year for this association, during which its membership has increased greatly and the interest in its work has grown accordingly.

The program for the convention is as follows:

THURSDAY AFTERNOON

- Convention opens at 1:30 p. m.
Address by Edmund M. Blake, president.
Report of Committee on Specifications, dealing principally with the specifications and inspection rules proposed by the Tie committee of the American Railway Engineering Association for adoption by that association. These specifications will be discussed with reference to yellow pine ties by R. E. McKee, the Long-Bell Lumber Company; white and red oak ties by Walter Poleman, The Western Tie & Timber Company; redwood ties by H. M. Cochran, The Union Lumber Company; Douglas fir ties by R. L. France, The Southern Pacific; ties manufactured from Rocky Mountain timber by B. Coldren, The Hallack & Howard Lumber Company; and ties manufactured from cedar and northern hardwoods by Benjamin Finch of Finch Brothers.

FRIDAY MORNING

- 9:00 a. m.
Reports on tie production from the eleven tie producing districts of the association.
The Relation Between the Tie Producers, Treating Plants and the Railroads, by R. A. Calvin, The Kettle River Company.
The Various Factors Entering into the Cost of Delivered Cross Ties, Both to Producing and Non-Producing Roads, by Howard Andrews, The Nashville Tie Company.
The Function and Necessity of the Small Mill in Tie Production, by J. S. McGladry, The Bohemia Lumber Company.

FRIDAY AFTERNOON

- The Use of Mechanical Power in the Production of Cross Ties, by R. J. Witherell of L. D. Leach & Co.
The Timber Resources of the United States, with Special Reference to the Pacific Coast, by C. L. Hill, in charge Office of Forest Products, California district, U. S. Forest Service.
The Tie Supply of the Future, by John Foley, forester, Pennsylvania Railroad.
The Effect of Increased Costs of Cross Tie Renewals upon Permissible First Cost of Ties in the Track, by R. H. Howard, chief engineer, maintenance of way, Wabash Railway.
The Economics of Railroad Tie Purchasing, by E. E. Pershall, T. J. Moss Tie Company.
Open discussion on standardized specifications and inspection and action upon them by the association.

On Saturday a special train will convey the members of the association and their guests into the forest of big redwood trees near Santa Cruz, Cal. For those members and guests who can arrive in San Francisco on the evening of January 24, the committee has also planned a special two-day trip into the redwood forests, logging camps and mills located in Humboldt and Mendocino counties, Cal.

THE ROADMASTERS' ASSOCIATION

At a recent meeting of the executive committee the following members were appointed on the committees for the ensuing year:

The Classification and Distribution of Second-Hand Rail, L. E. Dale, supervisor, P. R. R., Philadelphia, Pa., chairman; J. Goos, inspecting engineer, G. N., St. Paul, Minn.; T. Quinlivan, roadmaster, D., L. & W., Buffalo, N. Y.; D. C. McGregor, supervisor, B. & O., Glenwood, Pa.; J. H. McFadden, general roadmaster, M. P., Little Rock, Ark.; R. H. Smith, assistant superintendent, N. & W., Roanoke, Va.; J. E. Bone, roadmaster, M. P., St. Louis, Mo.; C. W. Baldridge, assistant engineer, A., T. & S. F., Chicago; W. A. Brandt, roadmaster, C. & N. W., Clintonville, Wis.; William Shea, general roadmaster, C., M. & St. P., Chicago; C. J. Coon, engineer of track, N. Y. C., New York City; P. M. Dinan, supervisor, L. V. Geneva, N. Y.; J. H. Reagan, super-

intendent of track, G. T., Detroit, Mich.; and M. Donahoe, general roadmaster, C. & A., Bloomington, Ill.

The Most Economical Method of Handling and Renewing Cross and Switch Ties, With Special Reference to Conserving Time and Timber. E. P. Hawkins, division engineer, M. P., Osawatimie, Kan.; chairman; C. O. Congdon, trainmaster, M. P., Hoisington, Kan.; George W. Koontz, roadmaster, D. & H., Carbondale, Pa.; R. J. Vaughan, general roadmaster, U. P., Green River, Wyo.; W. L. Anglin, roadmaster, N. & W., Petersburg, Va.; John Barth, supervisor, C., C. & St. L., Mattoon, Ill.; S. R. Cupples, roadmaster, S. P., Truckee, Cal.; F. N. Baldwin, general roadmaster, T. & P., Alexandria, La.; J. P. Costello, roadmaster, A., T. & S. F., Pueblo, Colo.; Walter Johns, supervisor, P. R. R., Trafford, Pa.; R. Swenk, supervisor, P. R. R., Norristown, Pa.; J. O'Leary, general roadmaster, G. N., St. Paul, Minn.

Methods of Stimulating Rivalry Between Track Forces. G. T. Koontz, chairman, roadmaster, D. & H., Carbondale, Pa.; L. S. Weaver, Erie, Susquehanna, Pa.; M. J. Nugent, D. & H., Albany, N. Y.; C. H. Gruver, C., R. I. & P., Manly, Ia.; J. H. Logan, C., R. I. & P., Pratt, Kan.; J. S. McGuigan, St. L.-S. F., St. Louis, Mo.; F. J. Meyer, N. Y., O. & W., Walton, N. Y.; R. J. Vaughan, U. P., Green River, Wyo.; W. Shea, C. & St. P., Chicago; E. P. Hawkins, M. P., Wichita, Kan.; H. T. Reinicker, assistant superintendent, N. & W., Portsmouth, O.; R. W. E. Bowler, supervisor, P. R. R., Washington, D. C.; James McCoy, supervisor, P. R. R., Jersey City, N. J.; J. W. Powers, supervisor, N. Y. C., Rochester, N. Y.; G. O. Broussard, roadmaster, S. P., Morgan City, La.; E. Keough, assistant engineer maintenance of way, C. P., Montreal, Can.

The Construction and Maintenance of Railroad Crossings. D. O'Hern, chairman, roadmaster, E. J. & E., Joliet, Ill.; L. C. Ayers, assistant superintendent N. & W., Crewe, Va.; G. S. Brooks, roadmaster, T. R. R. A. of St. L., St. Louis, Mo.; M. Ganly, roadmaster, A., T. & S. F., Argentine, Kan.; R. Harris, supervisor, P. R. R., Philadelphia, Pa.; C. T. Kembrough, roadmaster, I. H. B., Gibson, Ind.; J. E. McNeil, inspector of track, A., T. & S. F., Los Angeles, Cal.; James McDonald, roadmaster, K. & I. Ry., Louisville, Ky.; Charles Newberg, roadmaster, C. & N. W., Chicago; G. Stewart, supervisor, P. R. R., Newark, Del.; T. Thompson, roadmaster, A., T. & S. F., Joliet, Ill.; W. R. Weirs, roadmaster, C., B. & Q., Aurora, Ill.; J. B. Martin, supervisor, N. Y. C., Elkhart, Ind.; C. J. Coon, engineer of terminals, N. Y. C., New York City; Mike Griffin, supervisor, C. R. R. of N. J., Jersey City, N. J.; C. E. Genter, roadmaster, B. R. & P., Bradford, Pa.; G. G. Austin, general roadmaster, Chicago Junction, Chicago, Ill.

The Records and Accounts of a Roadmaster's Office. F. J. Meyer, chairman, assistant engineer, N. Y., O. & W., Middletown, N. Y.; I. D. Talmage, acting roadmaster, N. Y., O. & W., Walton, N. Y.; W. F. Muff, roadmaster, A., T. & S. F., Newton, Kan.; T. F. Donahue, supervisor, B. & O., Pittsburgh, Pa.; J. B. Oatman, division engineer, B. R. & P., DuBois, Pa.; W. O. Tracy, assistant engineer, N. & W., Bluefield, W. Va.; A. W. Lulus, office of division engineer, Erie, Jersey City, N. J.; K. M. Hamman, supervisor, L. I., Jamaica, N. Y.; H. H. Kauffman, supervisor, P. R. R., Middletown, Pa.; J. T. Sexton, supervisor, N. Y. C., Rochester, N. Y.; F. Kane, accounting engineer, P. R. R., Philadelphia, Pa.; Charles Butler, roadmaster, S. P., Deming, N. M.; E. T. Howson, editor, *Railway Maintenance Engineer*, Chicago; Morris Donahoe, general roadmaster, C. & A., Bloomington, Ill.; F. H. Hansen, general roadmaster, G. N., Grand Forks, N. D.; H. A. Halverson, roadmaster, C. & St. P., Eagle Grove, Ia.; Henry Ferguson, supervisor of track, G. T., Toronto, Ont.; J. R. Shea, traveling engineer, D. & I. R., Two Harbors, Minn.; W. R. Thompson, roadmaster, C. of Ga., Columbus, Ga.

In addition it was decided to endeavor to secure papers for presentation at the annual convention which will be held at Chicago in September, 1921, as follows:

The Budget System as Applied to Track Work, by C. A. Morse, chief engineer, C. R. I. & P., Chicago.

Results Obtained from the Use of Treated Ties, by J. H. Waterman, superintendent timber preservation, C. B. & Q., Galesburg, Ill.

The String-Lining of Curves—Methods and Results, by H. L. Pierce, supervisor, Pennsylvania Railroad, Cresson, Pa.

The Committee on Arrangements for the next annual convention was appointed, with E. T. Howson, editor *Railway Maintenance Engineer*, Chicago, chairman; D. O'Hern, roadmaster, E. J. & E., Joliet, Ill.; A. E. Muschott, roadmaster, E. J. & E., Joliet, Ill.; W. Shea, general roadmaster, C. M. & St. P., Chicago; and J. P. Corcoran, roadmaster, C. & A., Bloomington, Ill.

THE MATERIAL MARKET

THE MONTH of December witnessed a further slump in practically all lines of materials. In the case of iron and steel, this has served to bring about an adjustment of quotations for those commodities which had hitherto remained on the higher level. In the case of rail, the price has been definitely established on the lower level by orders for nearly one-half million tons placed on the \$47 basis. Nearly all prices are now squarely on the United States Steel Corporation level with some minor adjustments, such as in the case of track spikes, which are quoted at \$3.65 Pittsburgh instead of \$3.35, the former standard.

	Prices in Cents Per Pound			
	November 20		December 30	
	Pittsburgh	Chicago	Pittsburgh	Chicago
Track spikes	\$3.35 to \$...	\$3.73 to \$4.38	\$3.65	\$4.03
Track bolts	4.35 to ...	4.73 to 5.38	...	4.98
Angle bars	2.75 to ...	2.75 to ...	2.45	2.75
Tie plates, steel	2.75 to ...	2.75 to 3.50	...	3.00
Tie plates, iron	2.75 to ...	2.75 to 4.00	...	3.00
Plain wire	3.25 to 4.00	3.63 to 4.38	3.25	3.63
Wire nails	3.25 to 4.50	3.63 to 4.88	3.25	3.63
Barbed wire, galv.	4.10 to 5.10	4.48 to 5.48	3.95	4.33
C. I. Pipe, 6 in. or larger (per ton)	...	83.10	...	64.10
Plates	2.65 to 3.00	3.03 to 3.38	2.65	3.03
Shapes	2.45 to 3.00	2.83 to 3.48	2.45	2.83
Bars (steel)	2.35 to 3.00	2.73 to 3.38	2.35	2.73

Prices in the scrap market have also continued to fall, notably in the case of relaying rails, which have dropped \$10 and rerolling rails, which have dropped nearly as much. Scrap prices are now practically on the March, 1919, minimum.

	Per Gross Ton			
	Chicago		St. Louis	
Relaying rails	\$40.00 to \$45.00		\$35.00 to \$40.00	
Rerolling rails	16.00 to 16.50		17.00 to 17.50	
Rails less than 3 ft. long	17.00 to 17.50		16.00 to 16.50	
Frogs and switches, cut apart	15.50 to 16.00		14.00 to 14.50	
	Per Net Ton			
	Chicago		St. Louis	
No. 1 railroad wrought	13.50 to 14.00		16.50 to 17.00	
Steel angle bars	15.00 to 15.50		14.00 to 14.50	

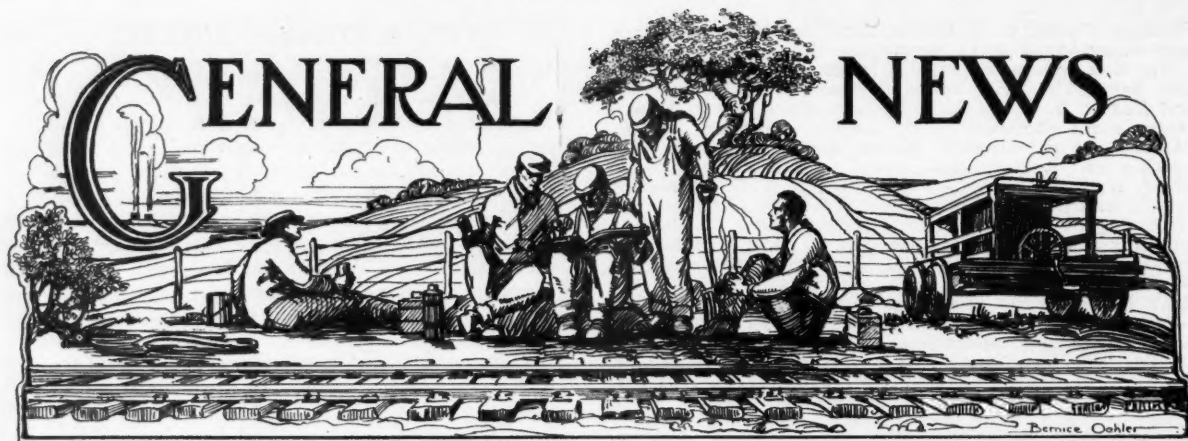
Cement prices have not changed except for minor modifications made as a consequence of changes in freight rates. Cement prices per barrel, not including package, in carload lots are as follows:

Pittsburgh	\$2.42	St. Paul	\$2.71
Cleveland	2.73	Toledo	2.71
Indianapolis	2.57	Milwaukee	2.59
Chicago	2.37	Duluth	2.35

Lumber prices have continued to fall during the past month in spite of the pronounced drop in October. Typical southern pine and Douglas fir prices are given in the table below:

Southern Pine Mill Prices	
Flooring, 1x4, B & B flat	\$43.82
Boards, 1x8, 14 & 16, No. 1	29.02
Dimension, 2x4, 16, No. 1	22.93
" 2x10, 16, No. 1	23.95
Timbers, 4x8 to 8x8, No. 1	28.65
" 3x12 to 12x12, No. 1	38.96
Douglas Fir Seattle Prices	
Flooring, 1x4, No. 2, clear, flat	\$32.00
Boards, 1x6, 6 to 20, No. 1, common	16.50
Dimension, 2x4, 16, No. 1, common	15.50
" 2x10, 16, No. 1, common	15.50
Timbers, 6x6 to 8x8, No. 1, common	23.00
" 10x10 to 12x12, No. 1, common	26.00

The general trend of sawed tie prices is following that of lumber. In the case of hewn ties furnished by small producers the U. S. R. A. prices still generally prevail. However, the indications are that these also will soon suffer a decline. Railway tie agents are receiving offers of large supplies of ties daily.



John Barton Payne, Director-General of Railroads, has issued a circular announcing the abolition of the boards of adjustment created by the Railroad Administration.

Friday, November 26, marked the completion of the first 10 years' use of the Pennsylvania Railroad station in New York City, and the Hudson River tubes.

Railroads are not required to fence at spurs, Y-tracks, sidings, crossings and turntables and are liable for injury to animals at such places only where negligent, according to the Montana fencing law.

The American Society of Civil Engineers will hold its sixty-eighth annual meeting at the headquarters of the society, 33 West Thirty-ninth street, New York City, on Wednesday and Thursday, January 19 and 20, 1921.

The shops of the Southern Pacific at Houston, Tex., including the paint shop, air brake shop, storehouse and office, together with a number of cars, were badly damaged by fire on December 7. The estimated loss is \$350,000.

The Canadian Pacific has advised pensioners who, during the war, received 125 per cent of their regular or normal sums that this increase, allowed because of the increase in the cost of living, will be continued during 1921.

A bill giving the Interstate Commerce Commission power to fix the price of coal and to regulate the coal business under such powers "as it now exercises over railroads" has been introduced in Congress by Representative McLane.

The Western Society of Engineers, Chicago, will devote Friday evening, January 14, to the consideration of timber preservation, at which time John Foley, forester of the Pennsylvania System, will present a paper on "The Tie Supply of the Future."

The Pennsylvania Railroad has issued a leaflet which is being distributed among employees to whom annual or other passes are issued for the year 1921, in which attention is called to the fact that the privilege of free transportation carries with it a duty to surrender seats in crowded trains to pay passengers.

The Interstate Commerce Commission announced its decision on December 20 approving and authorizing the consolidation of the express transportation business and property devoted to that business of the Adams, American, Wells Fargo and Southern express companies into the American Railway Express Company.

In Co-operation with the American Society of Steel Treating, two of Chicago's leading technical institutes will offer evening courses in the subjects of forging and heat treatment of steel. These courses are specially planned for the benefit of the practical men in the forge shop or heat treating departments or those who wish to qualify for such work.

The Pullman Company has recently adopted a plan for arbitrating differences and improving relations between the company and its working forces through the selection of employee committees. These committees are to be empowered to confer with the management on questions of

wages, working conditions and other matters of importance to the welfare of the employees.

The Railroad Labor Board ruled on December 11 that it had not been given jurisdiction over the wages and working conditions of employees on electrically operated interurban railways by the terms of the Transportation Act. Accordingly the board dismissed the demands of employees of short lines for the same rates of pay awarded to employees of Class 1 roads.

The most numerous single class of railroad employees is that of office men. This statement is surprising, but it can be fully justified. The latest report of the Pennsylvania System shows that out of a total of 272,000 officers and employees of all grades, over 38,000 are office men. They exceed by more than 10,000 the next most numerous group—the maintenance of way forces.

Representative Bland, of Indiana, has introduced a bill in the House to require railroads to maintain at all places where 20 or more employees are customarily employed, or customarily begin or end their day's work, such washrooms as may be required for their health and safety, including, when required, facilities for changing clothes. The Interstate Commerce Commission would also be authorized by this bill to order carriers to provide washrooms.

An appropriation for the Interstate Commerce Commission for the fiscal year of 1922 of \$4,893,100 has been recommended by the committee on appropriations of the House of Representatives. This is \$200,000 more than was appropriated for 1921, but \$681,400 less than the commission estimated would be required. For the Railroad Labor Board the committee recommended \$400,000, or \$150,000 less than was asked.

On December 16 the Senate passed without discussion the drastic anti-strike bill introduced at the last session of Congress by Senator Poindexter. The bill prohibits attempts to persuade railway employees to quit their employment with intent to obstruct, delay, hinder or prevent the movement of commodities in interstate or foreign commerce, the use of violence or threats to seek to prevent any person from engaging in employment or continuing in employment in connection with any means or agency of interstate or foreign commerce.

The board of direction of the American Society of Civil Engineers has reconsidered its resolution of November 9, regarding the dissolution of the Engineering Council. As it now appears that participating societies, such as the American Society of Mechanical Engineers, the American Institute of Electrical Engineers and the American Institute of Mining and Metallurgical Engineers, may discontinue their work in the Engineering Council as a consequence of their having joined the Federated American Engineering Societies, it was resolved that the representation of the A. S. C. E. be authorized to join with a majority of the member societies in action to terminate the existence of the Engineering Council at the end of the year 1920.

PERSONAL MENTION

GENERAL

R. C. White, assistant chief engineer of the Missouri Pacific, St. Louis, Mo., has been promoted to general superintendent of the Eastern district of the Missouri Pacific, with headquarters at St. Louis, Mo. Mr. White was born at Bertrand, Mo., on February 8, 1881, and attended the University of Missouri, later entering West Point. In June, 1905, he entered railway service as an assistant on an engineering corps of the Missouri Pacific, with headquarters at St. Louis, Mo. The following two years he was assistant engineer and roadmaster on the Eastern, Central Kansas and White River divisions. From September, 1908, until April, 1914, Mr. White served consecutively as assistant engineer, division engineer and general roadmaster on the Memphis, Central and Arkansas divisions of the Southern district. In April, 1914, he was appointed engineer maintenance of way of the Southern district, with headquarters at Little Rock, Ark., and in January, 1917, was made division superintendent. In August, 1918, he was promoted to assistant chief engineer, with headquarters at St. Louis, Mo., and in March, 1920, was given jurisdiction over maintenance of way and structures, with the same title. This was the position he held at the time of his recent promotion.

William J. Harahan, formerly president of the Seaboard Air Line and at one time vice-president of the Erie, in charge of engineering, has been elected president and a director of the Chesapeake & Ohio and the Hocking Valley, succeeding **George W. Stevens**, deceased. Mr. Harahan was born at Nashville, Tenn., on December 22, 1867, and entered railway service as a messenger and clerk in the superintendent's office of the Louisville & Nashville at New Orleans. In 1884 he went as apprentice into the Louisville & Nashville shops and in 1886 into the engineering department. For two years, beginning in 1889, he was engineer of the Cincinnati division of the Chesapeake & Ohio. In 1890 Mr. Harahan was placed in charge of structures on the Baltimore & Ohio Southwestern, two years later becoming roadmaster and trainmaster of the Pontiac division of the Illinois Central. In April, 1895, he was appointed assistant superintendent of the Freeport division and in October of the same year superintendent. In 1896 he became superintendent of



R. C. White



William J. Harahan

the Louisville division and in May, 1901, he was appointed chief engineer of the Illinois Central. From 1902 until 1904 he served as assistant general manager, in the latter year being promoted to general manager, and in 1905 was further promoted to fourth vice-president and general manager. In 1907 Mr. Harahan was appointed assistant to the president of the Erie and later was elected vice-president in charge of engineering. In 1912 he was elected president of the Seaboard Air Line and served as federal manager of that property during the period of government control.

F. F. Clarke has been appointed chief land surveyor of the Canadian National, with headquarters at Toronto. Mr. Clarke will report to the legal department.

ENGINEERING

L. W. Duffee, assistant chief engineer of the Gulf, Mobile & Northern, has resigned, effective December 31, 1920.

L. P. O. Exley, office engineer of the Mobile & Ohio, with headquarters at St. Louis, Mo., has been appointed office engineer of the Gulf, Mobile & Northern, with headquarters at Mobile, Ala.

G. N. Toops, assistant engineer on the Kansas, Oklahoma & Gulf, with headquarters at Muskogee, Okla., has been promoted to chief engineer, with the same headquarters, succeeding **W. O. Galbreath**, who has resigned.

H. F. McFarland, Jr., chief engineer of the Wichita Falls, Ranger & Fort Worth, with headquarters at Ranger, Tex., has been appointed chief engineer of the Wichita Falls & Southern, with headquarters at Graham, Tex.

R. W. Williams, assistant to the chief engineer of the Southern, with headquarters at Washington, D. C., has been promoted to engineer of maintenance of way and structures of the Southwestern district, with headquarters at Chattanooga, Tenn., succeeding **M. J. Connerton**, resigned. A sketch of Mr. Williams' railroad work appeared in the November, 1920, issue, page 448.

E. J. Henriques has been appointed office engineer of the Mobile & Ohio, with headquarters at St. Louis, Mo. **J. V. Johnston**, assistant to the bridge engineer, with headquarters at St. Louis, has been promoted to division engineer, with headquarters at Murphysboro, Ill., succeeding **S. F. Ryan**. **C. V. Irvine**, division engineer on the Columbus & Greenville, has been appointed assistant engineer of the Mobile & Ohio, with headquarters at St. Louis.

A. H. Porter, engineer of roadway of the Charleston & Western Carolina, with headquarters at Augusta, Ga., has been promoted to valuation engineer, with the same headquarters, and **L. S. Jeffords**, formerly assistant engineer on the Atlantic Coast Line, with headquarters at Savannah, Ga., has been appointed engineer maintenance of way, with headquarters at Augusta, Ga., the positions of engineer of roadway, assistant engineer and general roadmaster having been abolished.

H. L. Newman has been promoted to maintenance engineer of the Pittsburgh, Shawmut & Northern, with headquarters at Angelica, N. Y. Mr. Newman was born at Randolph, N. Y., on May 12, 1886. He entered railroad service in 1906 as a draftsman in the chief engineer's office of the Pittsburgh, Shawmut & Northern, subsequently serving as rodman and levelman. In 1911 he was appointed general foreman of maintenance and in 1912 transitman. From 1913 until 1918 Mr. Newman served as chief draftsman, in the latter year being placed in charge of all engineering, including valuation and location. He was serving in this capacity at the time of his recent appointment.

H. R. Gibson, division engineer on the Baltimore & Ohio, Western lines, with headquarters at Dayton, Ohio, has been transferred to a similar position on the Eastern lines, with headquarters at Connellsville, Pa., succeeding **A. P. Williams**. **R. E. Chamberlain**, division engineer, with headquarters at Chillicothe, Ohio, has been transferred to Dayton, to succeed Mr. Gibson. **J. L. Maher**, assistant division engineer, with headquarters at Cincinnati, Ohio, has been promoted to di-

vision engineer, with headquarters at Chillicothe, Ohio, in place of Mr. Chamberlain, while **W. P. Abbott**, assistant division engineer, with headquarters at Dayton, Ohio, has been transferred to Cincinnati, succeeding Mr. Maher.

R. C. Bardwell, whose promotion to engineer of water service of the Missouri Pacific, with headquarters at St. Louis, Mo., was noted in the November issue, was born at Tipton, Iowa, and graduated from the University of Illinois in 1909. In March, 1910, he entered the employ of the Dixie Portland Cement Company, Richard City, Tenn., as a chemist. Mr. Bardwell entered railway service in June, 1910, with the Missouri Pacific as traveling chemist in charge of water softening plants west of Kansas City, subsequently serving as assistant engineer and chief chemist in charge of water treatment on the entire Missouri Pacific System until his promotion as noted above. In his new position he has supervision over all water service matters on the Missouri Pacific lines.



R. C. Bardwell

J. N. Thompson, roadmaster of the Pittsburgh, Shawmut & Northern, with headquarters at Angelica, N. Y., has been promoted to superintendent, maintenance of way, with the same headquarters. Mr. Thompson was born in 1877 at Scio, Ohio. He entered railway service in 1896 as a trackman with the Pittsburgh, Cincinnati, Chicago & St. Louis, leaving that road in 1901 to become a rodman and later clerk to the engineer maintenance of way of the Cleveland, Cincinnati, Chicago & St. Louis at Galion, Ohio, and Springfield, Ohio. During 1905 and 1906 he served as an accountant in the chief engineer's office of the Brooklyn Rapid Transit, Brooklyn, N. Y., until 1907, when he became chief clerk to the engineer maintenance of way of the Pittsburgh, Shawmut & Northern. In 1911 he was promoted to general foreman and roadmaster and in 1914 to chief clerk to the chief engineer. From 1917 until the time of his recent promotion Mr. Thompson has served as secretary to the receiver in the engineering department and later as roadmaster.



J. N. Thompson

George Cottingham, Jr., roadmaster on the Northern Pacific, with headquarters at Carrington, N. D., has been appointed engineer maintenance of way of the Eastern division of the Chicago Great Western, with headquarters at Chicago, succeeding **Hugh Wilson**, appointed trainmaster on the Denver & Rio Grande, with headquarters at Denver, Colo., as noted in the November issue.

G. W. Payne, whose promotion to assistant engineer on the Memphis division of the Missouri Pacific, with headquarters at Wynne, Ark., was noted in last month's issue,

was born at Knoxville, Tenn., on November 12, 1883. He received his education at the University of Tennessee. Mr. Payne entered railway service with the Southern in 1901 as rodman, later being promoted to levelman, and in 1905 he became assistant engineer of construction. He left the Southern in 1906 to go with the Missouri Southern as assistant engineer and in 1907 he was promoted to chief engineer. From 1908 until 1909 Mr. Payne served as instrumentman on the Missouri Pacific, in the latter year being promoted to assistant engineer. From June, 1915, until April, 1919, he served with the Fifth Canadian Mounted Rifles, returning to the Missouri Pacific at the latter date as instrumentman, which position he held until his promotion as noted above.

William H. Penfield, engineer of track maintenance of the Chicago, Milwaukee & St. Paul, with headquarters at Chicago, has been promoted to engineer maintenance of way, with the same headquarters. Mr. Penfield was born on January 12, 1874, at Foxbury, Pa., and entered railway service with the Buffalo, Rochester & Pittsburgh in 1894. Prior to August 1, 1899, he served as chainman, rodman, leveler, transitman on location surveys, instrumentman on construction and maintenance work and office draftsman, and on the latter date became connected with the Chicago, Milwaukee & St. Paul as a resident engineer on construction and was made successively assistant engineer on maintenance and locating engineer, which positions he held until March 1, 1903, when he was appointed locating engineer on the Western Pacific. In 1905 Mr. Penfield returned to the St. Paul as engineer of construction, with headquarters at Butte, Mont., with jurisdiction over the location and construction of the main line between Butte and Lombard, Mont. Six years later he was promoted to assistant chief engineer, with headquarters at Chicago, and in February, 1913, he was made engineer of track maintenance, which position he held at the time of his promotion as noted above.



William H. Penfield

TRACK

David Ralston has been appointed roadmaster of the Fifth district of the Los Angeles & Salt Lake, with headquarters at Milford, Utah, succeeding **P. J. Adams**, transferred to the Sixth and Tintic subdivisions, with headquarters at Salt Lake City, Utah, in place of **J. W. DeFord**, resigned.

S. E. Sims, roadmaster on the Southern, Lines West, with headquarters at Hattiesburg, Miss., has been transferred to Selma, Ala., succeeding **E. L. Beasley**, granted leave of absence. **N. H. Self**, roadmaster, with headquarters at Birmingham, Ala., has been transferred to succeed Mr. Sims.

T. H. Dean, roadmaster on the Atlanta, Birmingham & Atlantic, with headquarters at Nicholls, Ga., has been appointed roadmaster of the First division of the Charleston & Western Carolina, with headquarters at Augusta, Ga., succeeding **L. E. Bryant**. **J. B. Goddard** has been appointed roadmaster of the Second division, with headquarters at McCormick, S. C., succeeding **D. H. Baldwin**. **P. W. Miller**, assistant general roadmaster, with headquarters at Augusta, Ga., has been appointed roadmaster of the Third division, with headquarters at Laurens, S. C., succeeding **B. W. Burton**.

E. B. Short, section foreman on the Missouri Pacific at Huttig, Ark., has been promoted to roadmaster of the Fel-

senenthal district, with headquarters at Ferriday, La., succeeding **A. C. Hinckley**, assigned to other duties. Mr. Short was born at Cherry Valley, Ark., on August 28, 1883, and entered railway service as a section laborer with the Missouri Pacific in 1906. In July, 1907, he was promoted to section foreman, with headquarters at Bethel, Ark., later being transferred to various other sections on the Memphis division. From 1912 until 1914, Mr. Short served as extra gang foreman, in the later year being appointed section foreman on the Louisiana division, which position he held until his recent promotion.

T. C. Barrett, roadmaster of the Des Moines division of the Chicago, Milwaukee & St. Paul, with headquarters at Des Moines, Iowa, has been transferred to the Mineral Point division, with headquarters at Janesville, Wis., succeeding **R. J. O'Connor**, who has been transferred to the Milwaukee terminals, in place of **J. Glynn**. **John Flanigan** has been promoted to roadmaster of the Des Moines division, with headquarters at Des Moines, Iowa, in place of Mr. Barrett. **N. F. Kelsey**, roadmaster at Farmington, Minn., has been transferred to Dubuque, Ia., succeeding **J. J. Lanin**. **A. H. Hobert** has been appointed roadmaster, with headquarters at Farmington, Minn., in place of Mr. Kelsey.

Paul Robertson, section foreman on the Missouri Pacific, has been promoted to roadmaster of the Gurdon district, with headquarters at El Dorado, Ark., in place of **E. Blagrove**, deceased. Mr. Robertson was born at Ball, La., on September 6, 1890, and entered railway service with the Missouri Pacific as a section laborer on July 19, 1905. From December, 1907, until March, 1908, he was employed as a carpenter in the bridge and building department, returning to the position of section laborer on the latter date. On January 4, 1910, he was promoted to section foreman, which position he held until April 27, 1916, when he served as assistant extra gang foreman until June 15, 1916. From this time until August 8, 1920, Mr. Robertson served in the capacity of section foreman. He was then promoted to acting roadmaster, which position he held at the time of his recent promotion.

Charles H. Shasteen, whose appointment to the position of track inspector of the Northern district of the Atchison, Topeka & Santa Fe, with headquarters at La Junta, Colo., appeared in the November issue, was born at Yellow Bud, Ohio, on October 10, 1875. He entered railway service with the Atchison, Topeka & Santa Fe in November, 1896, as a track laborer and was promoted to section foreman in February, 1899, later serving as extra gang foreman. From June, 1905, until May, 1907, Mr. Shasteen served as roadmaster at various points, being appointed yard foreman on the latter date. He was appointed switchman in July, 1907. In March, 1908, Mr. Shasteen was appointed extra gang foreman on the Arkansas river division and was promoted to acting roadmaster in February, 1912. From October, 1912, until May, 1920, he served as section and yard foreman, being promoted to assistant roadmaster at the latter date, which position he held at the time of his recent appointment.

J. A. Ford has been appointed roadmaster of the Bowie district of the Tucson division of the Southern Pacific, Pacific System, with headquarters at Bowie, Ariz., succeeding **F. D. Dutton**, who has been transferred to the Tucson district of the Tucson division, with headquarters at Tucson, Ariz., in place of **J. W. Starkey**, transferred. **T. A. Allen**, roadmaster, with headquarters at Benson, Ariz., has been transferred to the Deming district of the Tucson division, with headquarters at Deming, N. M., succeeding **C. Butler**, resigned. **C. H. Neal**, roadmaster of the Siskiyou district, with headquarters at Hornbrook, Cal., has been transferred to the Redding district, with headquarters at Redding, Cal., succeeding **C. L. Crow**, who has been transferred to the Klamath district, with headquarters at Klamath Falls, Ore., in place of **T. Connor**, transferred to the Siskiyou district, with headquarters at Hornbrook, Cal., in place of Mr. Neal. **F. E. Johnson** has been appointed acting roadmaster of the Montello district, with headquarters at Montello, Nev., succeeding **S. M. Robinson**.

E. A. Howland, whose promotion to roadmaster on the Dakota division of the Northern Pacific, with headquarters at Carrington, N. D., was noted in last month's issue, was

born in Iowa in 1880. He received his education at the University of Iowa and entered railway service with the Chicago & North Western in 1898 as a chainman, later being promoted to rodman. From 1904 until 1907 he served as rodman and assistant engineer on the Chicago, Rock Island & Pacific, leaving this road in the latter year to go with the Chicago, Milwaukee & St. Paul as resident engineer in charge of the Rosalia tunnel. In 1908 Mr. Howland went to the Northern Pacific as transitman on location and later served as resident engineer in Dakota. From 1910 until 1911 he served as transitman on the Central Railway of Oregon, going to the Northern Pacific in the latter year as assistant engineer in the valuation department. He left this road in 1912, but returned in 1917 as assistant engineer at Fargo, N. D., being appointed assistant roadmaster in 1920, which position he held at the time of his recent promotion.

BRIDGE

O. K. Peck, assistant bridge engineer of the Louisville & Nashville, has been appointed bridge engineer of the Detroit, Toledo & Ironton.

W. E. White has been appointed general foreman of bridges and buildings and water service, with headquarters at Chanute, Kan., succeeding **W. H. Hose**, deceased.

D. B. Taylor, master carpenter on the Baltimore & Ohio, with headquarters at Garrett, Ind., has been transferred to Grafton, W. Va., succeeding **W. T. Hopke**, who has resigned.

Charles Scott, formerly supervisor of bridges on the Buffalo, Rochester & Pittsburgh, with headquarters at East Salamanca, N. Y., has been promoted to acting engineer of masonry, with the same headquarters, in place of **George H. Stewart**. **W. E. Maley** has been promoted to acting supervisor of bridges and buildings, succeeding Mr. Scott.

G. T. Ray, whose promotion to supervisor of bridges and buildings on the Union Pacific, with headquarters at Marysville, Kan., was noted in last month's issue, was born at Memphis, Mo., on December 21, 1879. He entered railroad service in June, 1907, with the Atchison, Topeka & Santa Fe on construction work, leaving this road in 1909 to go with the Union Pacific as bridge carpenter. Mr. Ray was promoted to bridge foreman on June 29, 1912, and on July 1, 1916, was promoted to supervisor of bridges and buildings, with headquarters at St. Joseph, Mo. On July 1, 1918, he was appointed assistant supervisor of bridges and buildings, with headquarters at Marysville, Kan., which position he held until his recent promotion.

PURCHASES AND STORES

E. T. Burnett, general purchasing agent of the Norfolk & Western, with headquarters at Roanoke, Va., retired from active service on December 31.

J. B. Fowler has been appointed division storekeeper on the Pennsylvania, with headquarters at Fort Wayne, Ind.

G. W. Bichlmeir, purchasing agent of the Kansas City Southern, with headquarters at Kansas City, Mo., has been appointed purchasing assistant of the Union Pacific, with headquarters at Omaha, Neb.

L. Lavoie, assistant general purchasing agent of the Canadian National, with headquarters at Toronto, has been promoted to general purchasing agent, with the same headquarters, succeeding **E. Laugham**, retired.

F. Osterman, chief clerk of the purchasing department of the Chicago Great Western, has been appointed assistant purchasing agent of the Pere Marquette, with headquarters at Detroit, Mich.

OBITUARY

Gus Gullickson, roadmaster of the Yellowstone division of the Northern Pacific, with headquarters at Forsyth, Mont., died at Woodville, Wis., on November 14. Mr. Gullickson had been in the continuous service of the Northern Pacific since March 20, 1905. He entered the service as section laborer and track-walker, subsequently serving as section foreman, extra gang foreman, yard foreman and roadmaster.

CONSTRUCTION NEWS

The Atchison, Topeka & Santa Fe has applied to the Interstate Commerce Commission for authority to abandon a part of its Barnwell branch in San Bernardino County, Cal., for a distance of 15 miles.

The Santa Fe has awarded contracts to the Roberts & Schaefer Company, Chicago, for the construction of three reinforced concrete, automatic, electric locomotive coaling and sanding plants of 300 tons capacity each, to be located at Guthrie, Okla., Cushing and Skedee. The approximate contract price was \$165,000.

This company has awarded a contract to Fairbanks-Morse Co., Chicago, for a coaling station at Shawnee, Okla.

This road is constructing 10 additional stalls at its engine house at Amarillo, Tex., each stall to be 120 ft. long. The company is also lengthening 12 of the present engine stalls from 92 to 120 ft. The construction is of concrete and will cost approximately \$125,000.

The Atlantic Coast Line has awarded a contract to the Lackawanna Bridge Company, Buffalo, N. Y., for the construction of a reinforced concrete phosphate elevator at Tampa, Fla., to cost approximately \$40,000.

The Boston Elevated is constructing a storage yard at Forest Hills, Mass., which will cost approximately \$630,000. A car house and inspection shop at Forest Hills, to cost approximately \$500,000, and a general repair shop at Everett, complete with equipment for machine, wood and blacksmith work, a foundry and a paint shop, to cost altogether approximately \$3,500,000, are also contemplated.

The Canadian National has awarded a contract to the Pacific-Atlantic Construction Company, Ltd., Vancouver, B. C., for the completion of the company's terminal improvements at Vancouver, at a cost of approximately \$350,000.

The Canadian National is also contemplating the erection of a 350-ton coaling station at Chaudiere Junction, Que.

The Canadian Pacific has awarded a contract to Stewart & Welch, Calgary, Alta., for grading in connection with the construction of a line from Acme, Alta., east to Drumheller, a distance of 37 miles. The project, which is already under way, will involve the construction of four bridges with steel and concrete abutments of 100 ft., 110 ft., 130 ft. and 150 ft. lengths, respectively.

The Canadian Pacific plans to develop a local freight yard at Windsor, Ont., with team tracks for 320 cars and freight shed tracks for 40 cars. The contract for grading and track work for that portion of the team tracks to be installed this year has been let to A. E. Rigby, St. Catharines, Ont. Additional team tracks and the freight shed will probably be installed during 1921. The work is estimated to cost approximately \$500,000.

The Chicago & North Western is constructing a 40 ft. by 100 ft. brick car repair shed at Erie street and the North Western tracks, Chicago. The work is being handled by company forces.

The North Western has awarded a contract to Gaffin & Gehri, Fond du Lac, Wis., for the construction of an ice house of 15,000 tons capacity at Fond du Lac, to cost approximately \$44,000.

The Chicago, Indianapolis & Louisville, which was noted in the November issue (page 451) as contemplating the construction of car repair shops to cost approximately \$140,000, at LaFayette, Ind., has awarded the contract for this work to A. E. Kenner, LaFayette. The structure, which will have dimensions of 85 ft. by 440 ft., will be of brick and steel construction.

The Chicago, Milwaukee & St. Paul contemplates rebuilding its passenger station at Watertown, Wis., to replace a structure recently destroyed by fire.

The Chicago, Rock Island & Pacific will construct an ice house, 30 by 150 ft., at Belleville, Kan., to replace a structure destroyed by fire.

The Chicago Union Station, which was noted in the December issue as accepting bids for the construction of a tunnel under Harrison street, between Canal street and the Chicago river, has let a contract for this work to the W. J. Newman Company, Chicago.

This company has ordered 700 tons of structural steel from the Bethlehem Steel Company for use in the construction of the Van Buren street viaduct, Chicago.

The Cleveland, Cincinnati, Chicago & St. Louis has let a contract to the Walsh Construction Company, Davenport, Ia., for the grading and to I. D. Tuttle, Springfield, Ohio, for the bridges on eight miles of second track under construction from Winchester, Ind., to Farm Land. This work will cost approximately \$800,000. Fifteen miles of second track from Houston, Ohio, to Ansonia, were put into operation on November 15.

The Denver & Salt Lake is rebuilding its shops at Utah Junction, Colo., which were destroyed by fire, at a loss of \$250,000.

Duluth & Iron Range has applied to the Interstate Commerce Commission for certificate authorizing it to construct a line of 2.91 miles between Divide and Babbitt, Minn.

The Eastern Texas has received from the Interstate Commerce Commission a certificate authorizing the abandonment of its line between Lufkin, Tex., and Kennard, Tex., a distance of 30.3 miles.

The Georgia, Southwestern & Gulf has under survey 60 miles of a 155-mile line which it proposes to construct from Albany, Ga., to St. Andrews, Fla.

The Great Northern has awarded a contract to the N. W. & W. A. Nelson Co., Minneapolis, Minn., for grade elimination work at East Hennepin avenue, Minneapolis, where the roadway and street car tracks will run under the railway. The project, which is to cost about \$400,000, involves raising the grade of the railway, the construction of concrete abutments and the placing of a steel bridge.

The Gulf, Mobile & Northern has received from the Interstate Commerce Commission a certificate authorizing the abandonment of its Ellisville branch in Jones County, Miss.

The Illinois Central will construct a frame freight and passenger station at Sarpy, La., to cost approximately \$20,000 and a frame freight and passenger station at Dowell, Ill., to cost about \$8,000. The work will be done by company forces.

The Illinois Central has awarded a contract to M. J. Roach, Memphis, Tenn., for the strengthening and raising of its levee at Helena, Ark., at a cost of approximately \$30,000. Work on this project has been delayed pending negotiations for the right of way. The company has withdrawn its inquiry for bids for the construction of frame freight and passenger stations at Sarpy, La., costing approximately \$20,000, and at Dowell, Ill., costing about \$8,000, and will construct these stations with company forces.

This road contemplates the construction of new shops at Dubuque, Iowa. The company is also considering an extension to its present shop facilities at Waterloo, Iowa.

The Lehigh Valley has purchased at public auction, for \$142,000, a 40-acre tract of land at East Penn Junction, Pa., with the purpose in view of constructing on it a large freight yard. Definite plans for undertaking this work have not been announced as yet.

The Louisville & Nashville has awarded a contract to the Ogle Construction Company for the construction of a 600-ton coaling and sanding station at Loyall, Ky. The structure will be of reinforced concrete and will provide facilities for coaling and sanding locomotives on four tracks.

The Michigan Central contemplates the construction of a 30 ft. by 128 ft. brick freight station and office at Albion, Mich., replacing a structure destroyed by fire October 13.

The Missouri, Kansas & Texas will shortly receive bids for the construction of a frame freight and passenger station, 60 ft. by 160 ft. in area, at Hominy, Okla., to cost about \$21,000.

The Missouri, Kansas & Texas has awarded a contract to H. D. McCoy, Cleburne, Tex., for the construction of a roundhouse, shop, storehouse and roundhouse foreman's office at

Oklahoma City, Okla. The company contemplates enlarging its roundhouse and car facilities at Osage, Okla.

The Northern Pacific has let a contract to the Bay City Foundry & Machine Company, Bay City, Mich., for the machinery for a coaling station at Hinckley, Minn.

The Oahu Railway & Land Company will build a modern passenger station at Honolulu, including a restaurant and providing space for the general offices of the company.

The Oklahoma-Southwestern contemplates extending its lines from Nuyaka, Okla., to Henryetta, a distance of 12 miles. The project will involve the construction of 10 bridges, including one 110-ft. steel span, and the remainder of wood with lengths from 50 to 200 ft. The company plans to let contracts for the grading and will lay the track with company forces. The estimated cost of the project is \$600,000.

The Pacific Great Eastern is constructing a line from Williams Lake, B. C., to Deep Creek, a distance of 16 miles. The company has recently commenced operation of its new line, 68 miles in length, extending from Lone Butte, B. C., to Williams Lake. Completion of the Williams Lake-Deep Creek line will permit the Great Eastern to commence train service from Vancouver to Deep Creek, a distance of 294 miles.

The Pearl River Valley has applied to the Interstate Commerce Commission for a certificate authorizing it to abandon the operation of its line between mile posts 13 and 17 from Nicholson, Miss., and to construct a shorter line.

The Pennsylvania has let a contract to the Roberts & Schaefer Company, Chicago, for the construction of a 1,200-ton reinforced concrete coaling station and two concrete sanding plants at Wilmington, Del.

The Pere Marquette is receiving bids for the construction of a frame freight and passenger station at Clifford, Mich.

The Pere Marquette has received a certificate from the Interstate Commerce Commission authorizing the abandonment of a branch line from Rapid City, Mich., to Kalkaska, 11.47 miles.

This road has awarded a contract to the Roberts & Schaefer Co., Chicago, for the construction of a sand storage and gravity drying plant at the engine terminal now under construction at Saginaw, Mich. This company is also building engine terminals and yards at New Buffalo, Mich., and Plymouth, Mich.

The Philadelphia, Newton & New York has applied to the Interstate Commerce Commission for a certificate authorizing the abandonment of a short line in Philadelphia for which it is proposed to substitute a new connection.

The St. Louis-San Francisco, which was noted in the November issue, page 453, as accepting bids for the construction of a one story brick freight house at Ada, Okla., to cost approximately \$50,000, has let a contract for this work to the Kelly-Atkinson Construction Company, Chicago.

The Frisco contemplates the construction of a second track near Afton, Okla., in the spring.

The Southern Pacific is relaying 100 miles of main track between Lucin and Colin, Utah, and between Argenta and Harney, Nev., with new 90-lb. rail. The company is constructing additional facilities at Sparks, Nev., to accommodate the new icing plant of the Pacific Fruit Express. These improvements involve the purchase of 26 acres of additional right-of-way and the construction of about 2 miles of additional tracks. The yards at Carlin and at Wells, Nev., are being rearranged and extended, involving the construction of about 2¼ miles of tracks, and the shifting of 2,600 ft. of main tracks and 3,700 ft. of yard tracks. At Ogden, Utah, the company is constructing extensions to its tracks and is changing other tracks to improve switching conditions, which involve the construction of approximately 1¼ miles of new tracks, the shifting of 2,000 ft. of old tracks, and extensions to the tracks of the Union Pacific. The Central Pacific is constructing 2,693 ft. of new tracks at Ogden, Utah, and is shifting 2,000 ft. of old tracks to provide a connection with the icing tracks of the Pacific Fruit Express.

The Spokane & British Columbia has applied to the Interstate Commerce Commission for a certificate authorizing it to abandon a line in Ferry County, Wash., 36.3 miles, which

has been paralleled by a line of the Great Northern and which for some time has failed to pay operating expenses.

The Spokane, Portland & Seattle has let a contract for a 300-ton automatic coaling station to be erected at Fallbridge, Wash., to the Bay City Foundry & Machine Company, Bay City, Mich.

The Uintah Railway contemplates the construction of a line from Walton, Utah, to Bonanza, a distance of 20 miles.

The Uvalde & Northern has applied to the Interstate Commerce Commission for a certificate authorizing the construction of a line from Uvalde to Camp Wood, Tex., a distance of 37 miles.

The Wisconsin & Michigan has received a certificate from the Interstate Commerce Commission authorizing it to rebuild and resume the operation of a line of 7.17 miles between Faithorn Junction, Mich., and Aragon Junction.

IRON AND STEEL

The Baltimore & Ohio's orders for steel rails aggregate 85,000 tons for next season's delivery. The orders were distributed between the United States Steel Corporation's plants at Pittsburgh, the Illinois Steel Company at Chicago and the Bethlehem Steel Corporation at Sparrows Point. The total orders involve an expenditure of between \$3,500,000 and \$4,000,000.

The Buffalo, Rochester & Pittsburgh has ordered 5,000 tons of rails from the United States Steel Corporation.

The Chicago & North Western has ordered 50,000 tons of rails from the United States Steel Corporation.

The Chicago, Indianapolis & Louisville has ordered 352 tons of steel from the Indiana Bridge Company, Muncie, Ind., for a freight car repair shop at La Fayette, Ind.

The Cleveland, Cincinnati, Chicago & St. Louis has ordered 5,000 tons of rails from the United States Steel Corporation.

The New York Central has ordered 71,500 tons of rails from the Illinois Steel Company and 11,000 tons from the Carnegie Steel Company. Additional orders for 93,000 tons for 1921 requirements will also be placed.

The Norfolk & Western has ordered 50,000 tons of rails from the United States Steel Corporation.

The Northern Pacific has ordered 35,000 tons of rails from the United States Steel Corporation.

The Pennsylvania System has ordered 150,000 tons of rails for its 1921 requirements: 45,000 tons from the Carnegie Steel Company, 45,000 tons from the Cambria Steel Company, 10,000 tons from the Lackawanna Steel Company and 50,000 tons from the Bethlehem Steel Company.

The Southern Pacific has placed orders for 66,400 tons of rails for its 1921 requirements with the following companies: The Tennessee Coal & Iron Company, 50,000 tons; the Colorado Fuel & Iron Company, 14,046 tons, and the Lorain Steel Company, 2,354 tons.

The Southern Pacific has also ordered 2,000 tons of 90-lb. manganese steel rails from the Manganese Steel Rail Company, Hillburn, N. Y., which will be manufactured and rolled at the electric furnaces of the Illinois Steel Company at its south works, Chicago. The rails, which will contain from 0.95 to 1.35 per cent of carbon and from 10.5 to 15 per cent of manganese, are to be used on curves of eight degrees or over in the mountain districts of California.

The exports of track materials in October show substantial increases over the September figures. Spikes weighing 3,534,645 lb., and valued at \$142,611; 53,266 tons of rails, valued at \$3,426,671, and switches, frogs, splice bars, etc., valued at \$689,785, are the totals for the month. The largest shipment of spikes, 1,476,000 lb., valued at \$59,241, went to Cuba. Cuba, likewise, was the largest purchaser of rails, switches, frogs, splice bars, etc. The rail shipments to Cuba totaled 11,983, valued at \$699,112, and that country's consignments of switches, frogs, splice bars, etc., were valued at \$142,533.

SUPPLY TRADE NEWS

GENERAL

The Portland Cement Association has opened a Canadian office in the Birks Building, Vancouver, B. C., in charge of A. E. Foreman as district engineer.

The Hallidie Machinery Company, L. C. Smith building, Seattle, Wash., has been appointed representative of the Conveyors' Corporation of America, Chicago, formerly the American Steam Conveyor Corporation.

The Air Reduction Sales Company, New York, has just completed a four-story addition to its apparatus plant, Jersey City, N. J., of brick construction with reinforced concrete floors.

The Bastian-Blessing Company, Chicago, Ill., has appointed the Beck-Hill Corporation, 22 Thames street, New York, as its sole eastern railway representative.

The Reade Manufacturing Company has moved its plant from Hoboken, N. J., to 135 Hoboken avenue, Jersey City, N. J., where the new facilities permit a trebling of manufacturing capacity. Two new departments, a traffic department and a mechanical or service department, have been added to the organization, both of which are under the supervision of R. H. Bogle, sales manager of the railroad department.

The Chicago Bridge & Iron Works, Chicago, Ill., has opened a new sales office in the Forsythe building, Atlanta, Ga. Joseph L. Zeller, who has been with this company for a number of years, is in charge of this office and will handle sales in Georgia, Alabama, Tennessee and Florida.

The Chicago Pneumatic Tool Company has removed its rock drill plant from Cleveland, Ohio, to its Boyer pneumatic hammer plant at Detroit, Mich. The location of the company's air drill plant at 1241 East Forty-ninth street, Cleveland, remains unchanged.

The Toledo Crane Company, with main office and works at Bucyrus, Ohio, chartered in Ohio with a capital of \$500,000, succeeded the Toledo Bridge & Crane Company of Toledo, Ohio, on January 1, 1921. The new company has bought all drawings, patterns, records and every item pertaining to the crane business. W. F. Billingsley, who for the past 11 years has been active in the management of the crane department for the Toledo Bridge & Crane Company, holds an executive position in the management of the new company and the present crane department organization of the Toledo Bridge & Crane Company will continue under his direction.

PERSONAL

George Baker, formerly general sales manager for the Illinois Steel Company, Chicago, who retired from active service about two years ago, died recently.

M. J. Rice, formerly general freight agent of the Harvey district of the Baltimore & Ohio, has been appointed traffic manager of the Buda Company, Harvey, Ill.

William S. Boyce, formerly with the Rail Joint Company, New York City, has been appointed western sales manager for the Lundie Engineering Corporation, with headquarters at Chicago, Ill.

H. C. Holloway, secretary and general manager of the Maintenance Equipment Company, Chicago, has been elected vice-president. Fred N. Baylies, general sales agent, Chicago, has been elected vice-president.

Lucian C. Brown and George W. Brown, 50 Church street, New York City, have been appointed representatives in the New York district of the Edgewater Steel Company, Pittsburgh, Pa.

Ralph Lane, manager of eastern sales of the Germain Company, Pittsburgh, Pa., has been placed in charge of all the eastern sales, including the territory from Montreal to Norfolk, for the Mummert Lumber & Tie Company, Chicago.

J. C. Kopf, formerly manager of the engineering department of the Duff Manufacturing Company, has been appointed research engineer in charge of a newly established research department. F. W. Schwerin has been promoted to manager of engineering, succeeding Mr. Kopf.

H. G. Keller, manager of the Philadelphia, Pa., office of the Independent Pneumatic Tool Company, Chicago, has been promoted to manager of the New York office, and F. H. Charbono, manager at St. Louis, Mo., has been promoted to manager of the Philadelphia office to succeed Mr. Keller at Chicago.

Edward S. Jenison, who for the past five years has been manager of the Philadelphia, Pa., office of the Goulds Manufacturing Company, Seneca Falls, N. Y., has been appointed acting general sales manager, with headquarters at Seneca Falls, succeeding W. E. Dickey, retired.

P. S. Graver, general manager of the Graver Corporation, East Chicago, Ind., has been elected vice-president. K. W. Bartlett, formerly general manager of sales, has been promoted to succeed Mr. Graver, and William C. Gibson has been appointed to succeed Mr. Bartlett.

Charles T. Topping has severed his connection with the Lakewood Engineering Company, Cleveland, Ohio, to engage in business as the Charles T. Topping Machinery Company, Pittsburgh, Pa., dealer in construction equipment. The company will act as district sales representative of the Austin Machinery Corporation, Chicago.

Walter M. Taussig, treasurer and general manager of sales at New York of the American Chain Company, Inc., Bridgeport, Conn., has been elected second vice-president; Wilmot F. Wheeler, production manager, is now also treasurer, and Arthur P. Van Schaick, assistant general manager of sales, has been appointed general manager of sales.

H. L. Dean, formerly manager of the compressor and engine sales division of the Chicago Pneumatic Tool Company, New York, has resigned and J. F. Huvane has been appointed eastern manager of compressor and engine sales, with headquarters at 6 East Forty-fourth street, New York, and G. C. Vanden Boom has been appointed western manager of compressor and engine sales, with headquarters at 300 North Michigan boulevard, Chicago.

Howard C. Mull, manager of the sales department of the Verona Tool Works, Pittsburgh, Pa., with headquarters at Chicago, has been appointed manager of the railway department of the Reliance Manufacturing Company of Massillon, Ohio, with offices at Chicago. Mr. Mull was born at Cincinnati, Ohio, on July 13, 1889, and entered railway service in the engineering department of the Cleveland, Cincinnati, Chicago & St. Louis in 1910. Two years later he was transferred to Cleveland, Ohio, and placed in charge of safety matters. In May, 1913, he entered the employ of the Verona Tool Works, and two years later was promoted to representative of sales, western territory, with headquarters at Chicago. In 1918 he was appointed manager of sales, with headquarters at Chicago, the position he occupied at the time of his recent appointment.

William N. McIlravy has been elected chairman of the board of the Barrett Company, New York, succeeding Everley Childs, resigned, and Thomas M. Rainhard has been elected president in place of William Hamlin Childs, who has been elected chairman of the executive committee. The following directors have been elected: E. L. Pierce, president,



Howard C. Mull

Solvay Process Company; **W. H. Nichols, Jr.**, president, General Chemical Company; **Orlando F. Weber**, president, National Aniline & Chemical Company; **Walter B. Harris**, sales manager of the Barrett Company; **M. H. Phillips**, New York manager of the Barrett Company; **D. W. Jayne**, manager chemical department of the Barrett Company; **Clark McKercher**, general counsel of the Barrett Company, and **E. J. Steer**, secretary and treasurer of the Barrett Company. The following directors have resigned: **Harry W. Croft**, **J. H. Fulton**, **William S. Gray**, **Alexander C. Humphreys**, **Isaac B. Johnson**, **Powell Stackhouse**, **Hamilton Stewart**, **J. Harry Staats**, **H. D. Walbridge** and **Horace S. Wilkinson**.

H. H. Cosley, for 15 years in the Chicago sales office of the Cambria Steel Company, has been appointed contracting engineer for the Decatur Bridge Company, Decatur, Ill., with headquarters in the Westminster building, Chicago. Mr. Cosley graduated from the Ohio State University in 1901, and for the succeeding five years was with the Illinois Steel Company, which concern he left to enter the service of the Cambria Steel Company.

The Verona Tool Works, Pittsburgh, Pa., was recently reorganized when Alex Laughlin bought the controlling interest of the company from Harry S. Paul, who has retired.

The officers of the new company are: **Wm. F. Hart**, president; **Emanuel Woodings**, vice-president and general manager; and **F. G. Magnus**, secretary and treasurer. **John B. Seymour** has been appointed district sales manager at Chicago, succeeding **Howard C. Mull**, and **Porter L. Laughlin** has been appointed assistant district sales manager at Chicago, effective January 1.

Wm. F. Hart, the president of the company, entered business with the Lorain Steel Company at Lorain, Ohio, then a part of the Federal Steel Company, in 1899. In 1904, this plant was made a part of the National Tube Company, and at that time Mr. Hart was transferred to the Pittsburgh office of that company, where he remained until 1909. Upon the latter date he entered the service of the Central Tube Company, Pittsburgh, Pa., which company he was serving as vice-president at the time of his appointment to the presidency of the Verona Tool Works in November, 1920. Previous to 1909, Mr. Hart was in the operating and manufacturing end of the steel business, but since that time his experience has been entirely executive, embracing both manufacturing and sales.

Emanuel Woodings, vice-president and general manager of the company, entered upon his thirty-fourth year of service with the company on January 6, 1921. His service began

in the machine shop of the company in 1877 and he has served successively as foreman, superintendent and general manager. He was promoted to the latter position in 1904,

and in November, 1920, upon the reorganization of the company, was elected vice-president.

John B. Seymour, who has been appointed district sales manager at Chicago, was born in Newferryport, Mass., in 1877 and was educated at Yale, graduating in the class of 1899. He immediately entered the engineering service and until 1904 was employed by different roads in the Middle West. During that year he became connected with the National Lock Washer Company as sales agent and was promoted to western manager in 1911. In 1917, he resigned to enter the second officers' training camp at Fort Sheridan and during the war served as a lieutenant in the infantry. Upon his return from abroad and since his discharge, Mr. Seymour has been engaged in exploration and development work.

Porter L. Laughlin, assistant district sales manager at Chicago, attended Washington and Jefferson College and in 1913 became connected with the Central Tube Company, Pittsburgh, Pa. He served this company successively as purchasing agent, assistant to general manager and special representative from January 1, 1912, to December 1, 1920, except for the period from September, 1917, to February, 1919, when he served in the army as a lieutenant in the infantry.

Howard H. Marsh, for nearly eight years district manager of the Railway Maintenance Engineer and the other publications of the Simmons-Boardman Publishing Company at Cleveland, Ohio, has resigned to become president of the Victory Equipment Company, with office at New Orleans, La. As the head of the Victory Equipment Company he will handle the following accounts: **McMyler-Interstate Company**, Cleveland; **Ball Engine Company**, Erie, Pa.; **Schaefer Equipment Company**, Pittsburgh, Pa., and **Equipment Manufacturing Company**, Cleveland, Ohio. His education, business experience and wide acquaintance fit Mr. Marsh for his new undertaking. He is still a young man, having graduated at the University of Vermont in 1903 with the degree of

B. S. in Civil Engineering. That same year he entered the employ of Engineering News (now Engineering News-Record) as assistant to the western manager, and stayed there until 1907, when he was appointed western representative of Engineering-Contracting, with headquarters in Chicago. He left the latter place to go to Cleveland as district manager of the Simmons-Boardman Publishing Company at that city. Mr. Marsh's change of base is due entirely to his desire to be near his family, whom he was forced to send to the southwest that Mrs. Marsh's health might be restored. The reason in itself typifies the man, because during the years he has been in our employ his clean-cut ways, both in personal habits and in his relations with customers and associ-



William F. Hart



Emanuel Woodings



John B. Seymour



Howard H. Marsh

ates, at once commended him to all those with whom he came in contact. Few men are so universally liked, and the success with which Mr. Marsh met is a concrete example of the heights to which a young man who can always go into court with clean hands can rise. It is indeed satisfaction that Mr. Marsh will continue to take care of our interests in the southwest in addition to his other work.

Alexander S. Greig, formerly vice-president of the St. Louis-San Francisco and recently appointed vice-president of the H. Channon Company, Chicago, was born in Aberdeenshire, Scotland, on October 25, 1864, and entered railway service in 1883 in the purchasing department of the Denver & Rio Grande, subsequently serving as assistant to the general superintendent. In 1895 he was appointed trainmaster on the Atchison, Topeka & Santa Fe, and in 1897 was appointed general superintendent of the El Paso & Northeastern. Mr. Greig was appointed special assistant to the president of the Chicago, Rock Island & Pacific in 1902 and three years later became assistant to the president of the St. Louis-San Francisco. He was elected assistant to the chairman of the Rock Island-Frisco system in 1907 and in 1909 was promoted to vice-president of the Frisco lines, and at this time also served as assistant to the president, and also as president of the New Mexico & Arizona Land Company. When the Frisco went into receivership he became assistant to the receiver. In November, 1917, Mr. Greig was elected secretary of the General Operating Committee appointed to operate the Eastern railroads and on January 1, 1918, when the government took control, was transferred to the staff of the regional director of the Eastern region and served in that capacity during government control.

E. W. Englebright, who was engineer for the New York office of the Union Pacific until that office was merged recently with the organization of the assistant to the president, at Omaha, Neb., where he has been located since that time, has resigned to become associated with the Elvin Mechanical Stoker Company, New York. Mr. Englebright was born on January 12, 1885, at Oakland, Cal., and entered the employ of the Southern Pacific at Oakland, Cal., in 1903 as a rodman in the engineering department. He subsequently served as levelman and transitman until 1905, when he entered the University of California. He returned to the Southern Pacific in 1909 as assistant engineer on the Shasta division at Dunsmuir, Cal., and was promoted to assistant division engineer in 1910. From 1912 until 1913, Mr. Englebright served as roadmaster at Klamath Falls, Ore., in the latter year becoming assistant to E. E. Adams, then consulting engineer of the Union Pacific System for engineering, motive power and equipment standards, with headquarters at New York. Fol-



Alexander S. Greig



E. W. Englebright

lowing Mr. Adams' appointment in 1918 as engineer for the Division of Capital Expenditures at Washington, Mr. Englebright was appointed acting consulting engineer for the Union Pacific System corporation, with the added duties of purchasing the large number of locomotives and cars, orders for which were placed by the Union Pacific System prior to the termination of federal control. On the return to private control he became engineer for the New York offices of the Union Pacific System.

E. R. Gassman, formerly superintendent of telegraph and later in charge of operation and maintenance of way on the Trinity & Brazos Valley, has been appointed manager of the order and shipping departments of the Sinclair Refining Company, with headquarters at Chicago. Prior to his appointment to this position he was associated with the transportation division of the Bureau of Markets.

TRADE PUBLICATIONS

Increment Borer.—Keuffel & Esser Company, New York, has reissued its eight-page pamphlet on the Swedish Increment Borer, with a new price list. This pamphlet describes a small instrument for obtaining core drill specimens from trees or timber for the purpose of determining density or other qualities of the timber, depth of penetration of preservatives, etc.

Duff Jacks.—A new 140-page catalog has been issued by the Duff Manufacturing Company, Pittsburgh, Pa., covering its entire line of jacks, which include track, bridge, trench and other jacks used in the maintenance of way department. The larger part of the book is devoted to illustrations, tables and descriptions of the individual jacks, but the latter portion gives illustrations of the individual parts of the various jacks.

Osgood Railroad Ditchers. The Osgood Company, Marion, Ohio, has recently issued a 16-page illustrated bulletin descriptive of the railroad ditcher manufactured by this company. The data includes the specifications of the ditcher both for clam shell bucket and crane work, while line drawings show the principal dimensions, etc. The text is devoted to describing the various parts of the equipment, such as the frame, axles, boiler, hoisting machinery, etc., while illustrations show the completed equipment in operation as well as the individual parts.

Oxyacetylene Torches.—The Air Reduction Sales Company is distributing a booklet entitled "Cutting Cast Iron with the Oxyacetylene Torch." This booklet, which is a reprint of a paper by A. S. Kinsey, professor of shop practice, Stevens Institute of Technology, is well illustrated and describes how the cutting is done, gives necessary pressures of oxygen and acetylene for varying thickness of metal, outlines the advantages to be obtained from the use of the torch and compares it with other methods of cutting from an economical standpoint.

Burrows Defectoscope and Magnetic Analyzer. Holz & Co., Inc., New York, has recently issued a 20-page illustrated bulletin—No. 41—describing the use of the Burrows defectoscope for the detection of internal defects in iron and steel. The history and principles of magnetic analysis are discussed in the text, the major portion of which, however, is devoted to the construction of the instrument and the manner in which it is used when making an inspection of steel rails, rods, cables or other iron or steel material. The illustrations are composed of numerous curves, diagrams and photographs covering the results of actual tests as well as showing the manner in which the instrument is employed.

Cinder Handling Plants.—Roberts & Schaefer Company, Chicago, has issued Bulletin No. 39, consisting of 16 pages, illustrated, which describes several types of equipment manufactured and installed by that company for the handling of cinders from locomotive cinder pits. The descriptions cover simple conveyors for dumping into cars on an adjacent track and also more elaborate forms of equipment for conveying cinder from pits under a number of tracks to storage bins of several thousand cubic feet capacity.



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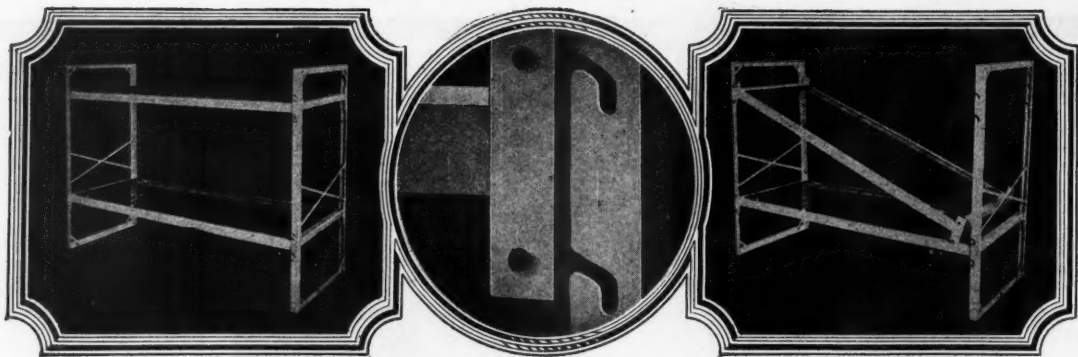
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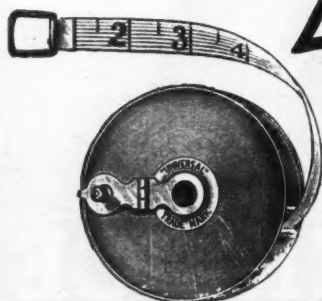
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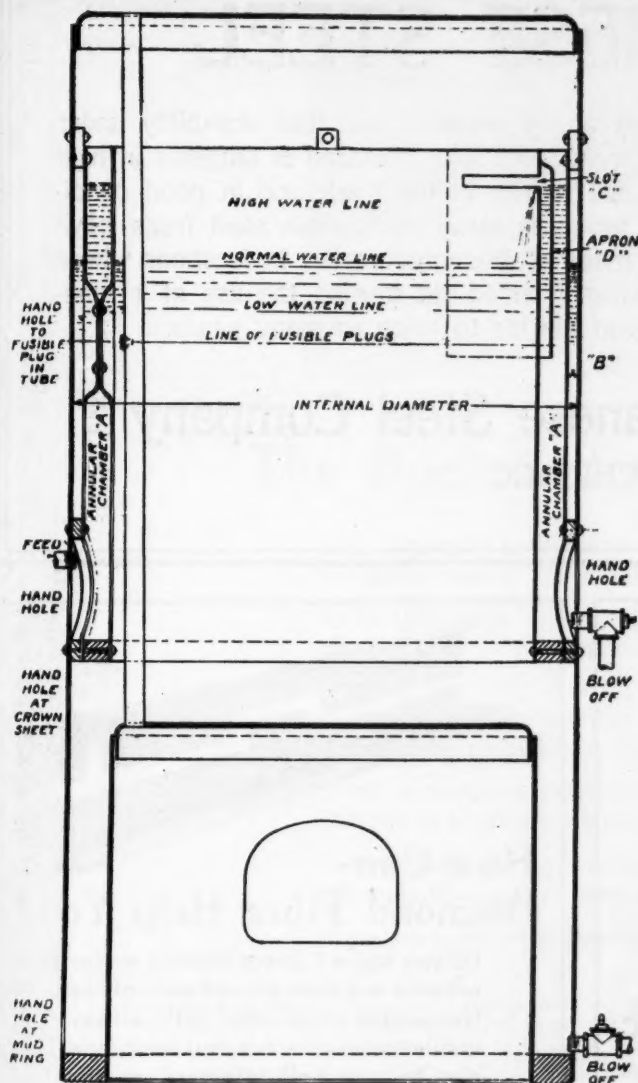
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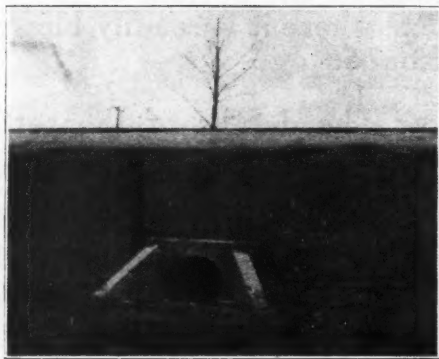
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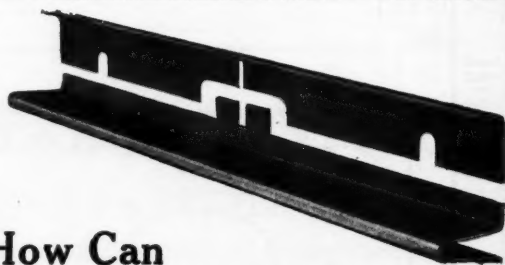
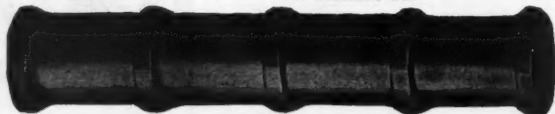
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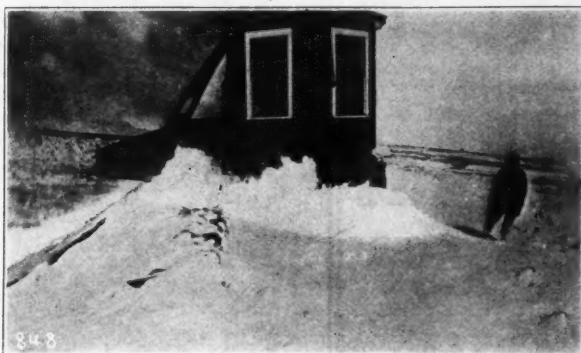
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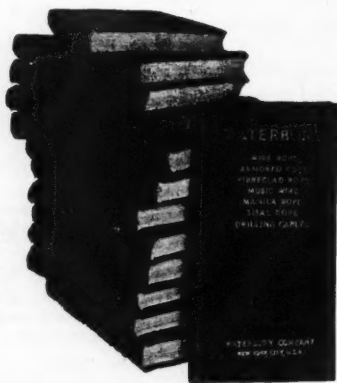
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Sheffield
40

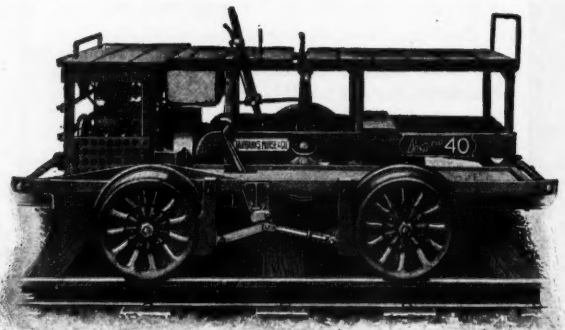
Motor Cars

The Sheffield "40" is the "truck horse" of railway motor cars. Hauling a big bridge gang or construction crew and a trailer load of material as well demands power. You get this when you specify the Sheffield "40."

The free running engine is horizontal, air cooled, 4 cycle, 2 cylinder, valve in head type, high grade in every respect. Positive force feed lubrication—oil is force-pumped to center of bearings, driving out dirt and grit—this purpose being accomplished without the use of oil tubes or pipes.

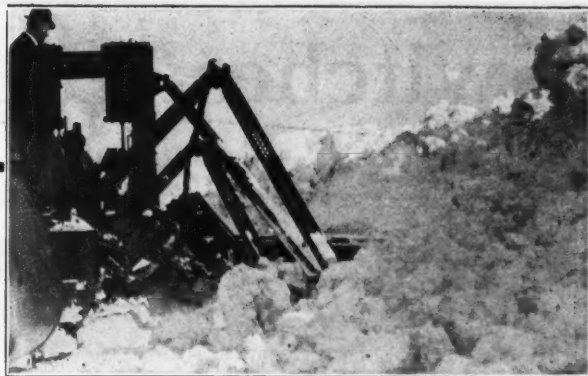
Friction transmission is so arranged that all strains are taken off of engine crankshaft and bearings—renders full engine power available at all loads and speeds. All steel frame. Ample room for men and materials. Pressed steel wheels with forged hub—powerful brake on all four wheels.

The Sheffield "40" is a proven car. Thousands of them are standing up daily under severe service.



Fairbanks, Morse & Co.
MANUFACTURERS CHICAGO

Oil Engines - Pumps - Electric Motors and Generators - Fairbanks Scales - Railway Appliances - Farm Power Machinery



ALL STEEL
AND
PNEUMATIC

ONE-MAN
OPERATION

To the Railway Man:—

Isn't it a huge satisfaction

In these days of Snow and Ice and Sleet
to know that your division is protected
against the worst effect of storms

**To
Prepare
Is
Half
The
Battle**

—the suspension of Traffic—

in so far, at least, as is humanly possible?

This satisfaction is yours if you have

A Jordan Spreader

With Ditching and
Bank Sloping Attachments

**Better
Be
On
The
Safe
Side**

It will carry the snow to a distance of
22 ft. from the center of the track, and
remove both snow and ice to a depth of
2 in. below the top of the rail.

In the open season it will prove invaluable
for making new ditches or cleaning
out old ones.

O. F. JORDAN COMPANY

Chicago and Kennedy Avenues

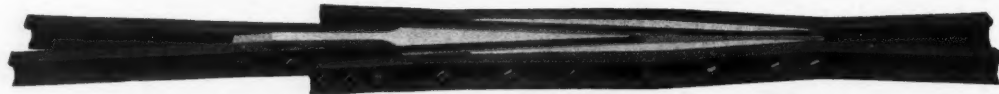
EAST CHICAGO, IND.

Frogs—Switches—Crossings

Special Track Work

MANGANESE STEEL

AND PLAIN RAIL CONSTRUCTIONS



A. R. E. A. Standard No. 10 Railbound Manganese Steel Frog.

Originators of the Use of Manganese Steel in Track Work

WM. WHARTON JR. & CO., Inc.
EASTON, PENNA.

Subsidiary of Taylor-Wharton Iron & Steel Co., High Bridge, N. J.
Other Plants: Philadelphia Roll & Machine Co., Philadelphia. Tioga Steel & Iron Co., Philadelphia.

Tell It Here—

The Railway Maintenance Engineer reaches the buying organizations of the most important operating railways of the United States and Canada—

It reaches 'em all along the line from the section foreman up to the Engineer of Maintenance of Way.

Maintenance of Way materials are required for over 295,000 miles of Railway in the U. S. and Canada.

The annual expenditure runs into the hundreds of millions.

If you make or sell anything for the Maintenance of Way Department, tell the buyers about it here—in the advertising pages of the

Railway Maintenance Engineer

READING SPECIALTIES

Pay for Themselves
With
SERVICE



Be Prepared for Derailments

You know what it means to tie-up the yard and hold up operation. Every minute counts—and to have the proper tools is half the job—without them you are lost.

READING Ready Replacers

are just the thing for such emergencies—no time lost, no spiking and no damaging the ties.

The Replacers are fastened to the Rails with Reading Clamps without going under the derailment. They cannot slip or turn over for the Replacers rest on the base of the rail. The ties are not depended upon to hold the replacers. When they settle, the rails settle with them.

Made for all weights of cars or engines and all heights of rails.

Write for details.

Heavier locomotives, greater capacity cars, heavier loadings with fast train schedules—mean greater strains and shocks on existing track.

Re-enforce your track against assaults from this heavier traffic by installing

READING Guard Rail Clamps

all along the line.

They are made of special heat treated steel, and so designed that the metal is distributed to point of greatest strain.

The wide end construction of the yoke prevents the clamp from slipping from its right angle position to the rail.

The flexible swing movement of the Reading Clamp acts as a shock absorber, relieves the strain on the yoke and reduces pulling in of stock rail at this point.

The clamp is applied without pulling spikes or moving guard rail.

Write for details.



READING SPECIALTIES

Guard Rail Clamps	Reversible Rail Benders
Car and Engine Replacers	Compromise or Step Joints
Tie Spacers	Rail Straighteners
Safety Derails	Portable Derails
Replacer Clamps	Rail Braces

Manufactured and Sold by

READING SPECIALTIES CO.

Home Office and Works

Dept. R-5.

Reading, Penna.

Branch Offices

111 Broadway, New York, N. Y.
4th Nat. Bank Bldg., Atlanta, Ga.
206 S. La Salle St., Chicago, Ill.
Colorado Bldg., Washington, D. C.
1st Nat. Bank Bldg., Denver, Colo.
525 Market St., San Francisco, Cal.
2003 Jefferson County Bank Bldg.,
Birmingham, Ala.

Sharp Curve—Unprotected Split Switch —Derailment

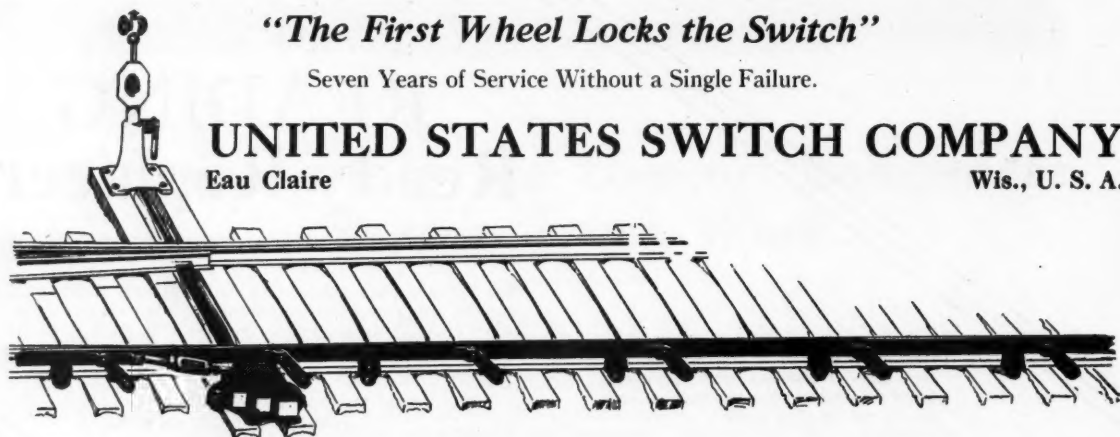
This sequence is made impossible by the use of the UNITED STATES AUTOMATIC SWITCH LOCK.

Absolute safety replaces the danger of derailment.

The Locking Bar is on the outside or high side of the curve and the first wheel that comes in contact with it locks the switch securely.

"The First Wheel Locks the Switch"

Seven Years of Service Without a Single Failure.



UNITED STATES SWITCH COMPANY

Eau Claire

Wis., U. S. A.



Buying paint for the protection of metal surfaces from rust and wear is no longer a haphazard experiment. It is an important investment, worthy of service contemplation.

With the high cost of labor in mind, the "cost per gallon" of paint is not the deciding factor, but how long does the paint last on the job?

DIXON'S Silica-Graphite PAINT

has won an enviable reputation for long service with satisfaction in all parts of the world.

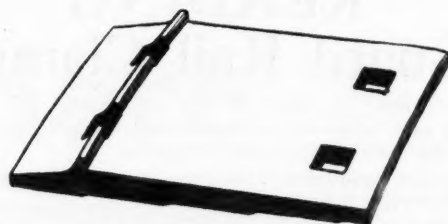
Graphite is not affected by sunlight, heat or cold, acids or alkalies, and it has no equal in withstanding dampness.

Silica is equally impervious and is to graphite paint what copper is to gold in a chain or watch-case. It resists wear and anchors the film. To secure these results, specify DIXON'S SILICA-GRAPHITE PAINT.

Write for Booklet 187-B.

Made in JERSEY CITY, N. J., by the
JOSEPH DIXON CRUCIBLE CO.

ESTABLISHED 1827



The Lundie Tie Plate

The Lundie Tie Plate is widely acknowledged by railroad men having such plates in track, as promoting decided economy in rail wear, in holding track to gauge and in giving easy riding track. It will far more than pay for itself in reduction of Operating Expenses.

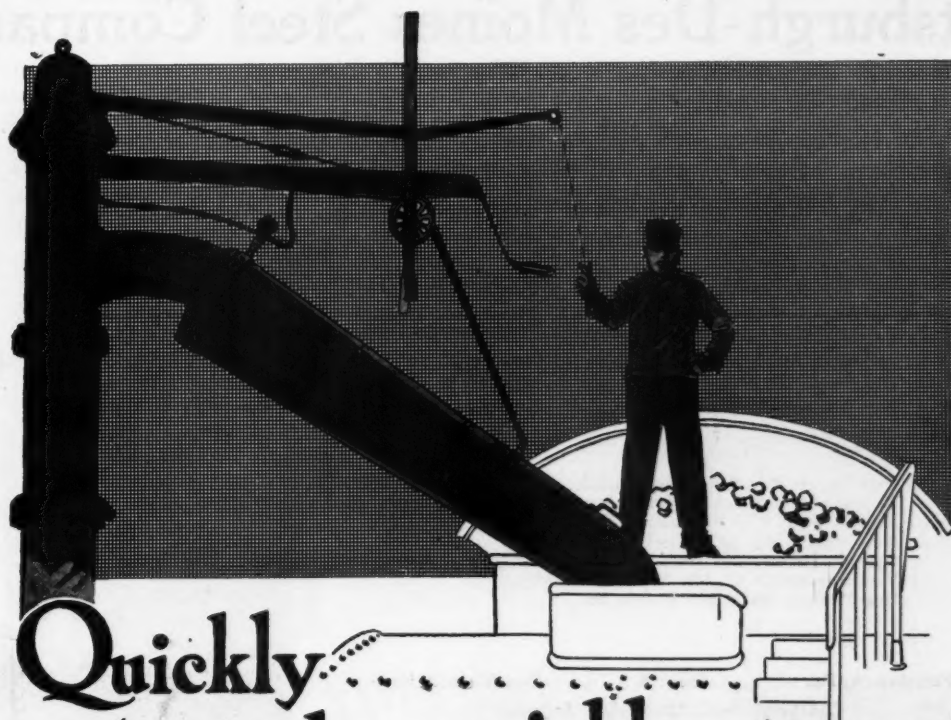
The features of the plate are—a sloping seat inclining the rail, so reducing abrasion and internal stresses in the rail to a minimum—a true camber promoting easy riding—and a bottom, as shown in the cut, so seating itself on the tie that the track is held firmly to gauge without injury to the tie.

The combination of these features, or their mechanical equivalent, is covered by Letters Patent, supported by other Patents covering certain individual features of the plate. Railroad companies pay no royalties on its authorized use.

The Lundie Engineering Corporation

920 Broadway, NEW YORK

Chicago Office, 30 North La Salle Street



Quickly started — quickly stopped an efficient water column **THE POAGE STYLE "H" *with* FENNER DROP SPOUT**

You want a water column that can be adjusted quickly without spotting the tender.

One that you can use with tenders of different heights.

One that can be shut off quickly without causing water hammer that injures the mains.

One that does not leak and waste water and become weighted with ice in winter.

One that will not be knocked over by an unexpected shift of the tender.

IN THE POAGE STYLE H

you can have such a water column. The spout has a vertical range of five feet and will reach tenders of any height. It has a lateral range of three feet which enables it to move to meet the tender. The open telescopic joint is not packed, yet it does not leak or waste a drop of water.

The valve shuts off quickly—85 per cent almost instantly and 15 per cent more slowly—the scientifically correct principle to secure quick closure without danger to the mains.

Write for the results of the University of Illinois tests.

Manufactured exclusively by

THE AMERICAN VALVE & METER COMPANY
CINCINNATI, OHIO

Pittsburgh-Des Moines Steel Company

As railroads are frequently forced to depend on muddy surface water and shallow wells for their water supply, the advantages of the conispherical bottom and large riser as settling and mud drum are apparent. The large riser when properly equipped has the additional advantage of anti-freeze design.

Let one of our engineers investigate your problems and assist you in solving them.

SALES OFFICES:

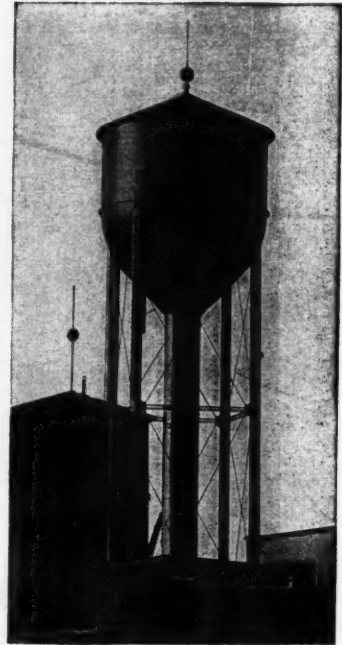
Pittsburgh, Pa., 920 Curry Building
Chicago, 1290 First National Bank Building
Dallas, Tex., 1235 Praetorian Building
New York City, 55 Church Street
San Francisco, Cal., 5000 Rialto Building
Washington, D. C., 958 Munsey Building
Des Moines, Iowa, 912 Tuttle St.

Pittsburgh, Pa.

SHOPS

Des Moines, Iowa

Chatham, Ont., 299 Inshes Avenue



PICKS



No. 5

Made of best high-grade open hearth steel, hammer forged and correctly tempered. Finished in black with polished points.

The Warren Tool & Forge Company

243 Griswold Street : WARREN, OHIO
U. S. A.

The Stowell Company

FOUNDERS AND MANUFACTURERS

South Milwaukee,

Wisconsin

"Certified" Malleable Castings Electric Steel Castings

Castings made, handled and tested in accordance with rigid and scientific methods.

Mail us your inquiries



WHETHER they are supplying water at a pumping station; forcing water into the boilers at terminal power stations; or simply pumping out a small sump hole in the yards—American Pumps *consistently make good.*

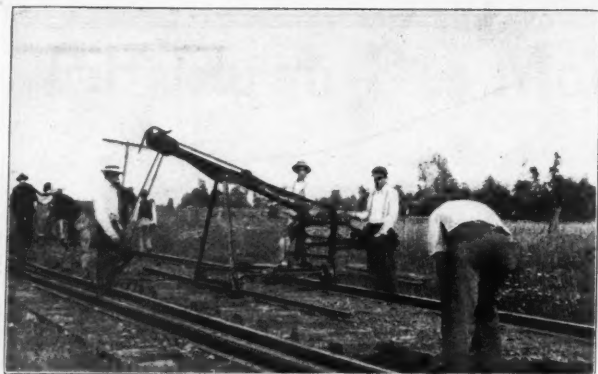
Refinements of fifty years of pump design and manufacture are built into every pump that leaves the factory—the efficient performance of each pump is a certainty—its per cent of efficiency guaranteed.

“American” engineers will gladly confer with you on your pumping proposition, whether your needs be centrifugals, deep well plunger pumps, or deep well turbines—of our standard types or special design.

THE AMERICAN WELL WORKS

General Office and Works
AURORA, ILL.

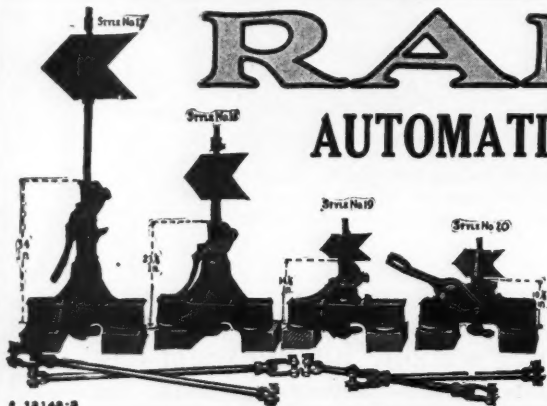
Chicago Office
FIRST NATIONAL BANK BLDG.



Records show that on those roads where the

THREE MEN RAIL LAYER has been furnished to each SUB-DIVISION the work of relaying steel has been reduced to a minimum. **YOU SHOULD GIVE THIS YOUR SERIOUS CONSIDERATION.**

MAINTENANCE EQUIPMENT CO.
Railway Exchange, Chicago



RAMAPO

AUTOMATIC SAFETY SWITCH STANDS

Switches, Frogs,
Guard Rail Clamps,
Industrial Cars, etc.
Manganese Track Work a Specialty

Ramapo Iron Works

HILLBURN, NEW YORK

Plants at Hillburn, N.Y. and Niagara Falls, N.Y. New York Office, 30 Church Street



LIDGERWOOD HOISTS

Steam, Electric and Gasoline

For Pile Driving, Derricks, Bridge Erection, Coal Towers, Etc.
Draw Bridge Engines, Ballast Unloaders, Excavators, Cableways

Write for Catalogues

LIDGERWOOD MANUFACTURING CO.

96 Liberty Street, New York.

Philadelphia Pittsburgh Chicago Los Angeles Seattle London, Eng.

Specialists in the Design and Manufacture of

Standard—Insulated—Compromise Rail Joints

The Rail Joint Company; 61 Broadway, New York City

Costs the Consumer Nothing



There are many cases on record in which the use of Boronics for cleansing metal has cost the consumer nothing, even though full account is taken of the value of the commercial metal used in Boronic treatment.

This actual cost is counterbalanced by the saving of the loss of castings inevitable without this treatment.

Boronic Products

can show records of no losses when the product adapted to the particular metal and its purposes has been used.

The superior quality of cleansed metal goes without saying.

Address all American Inquiries to

American Boron Products Company, Inc.

(Sole Manufacturers)

READING, PENNA., U. S. A.

Foreign Distributors:

EDWARD LE BAS & CO., London, E. C. (3), Eng.
NATIONAL ALLOYS, LIMITED, London, Eng.
CHINA & JAPAN TRADING CO., LIMITED, Kobe, Japan
CHINA & JAPAN TRADING CO., Shanghai, China

To the Metal Manufacturer or the Individual Mixer of Metals:

PLEASE USE THIS COUPON

American Boron Products Co., Inc., Reading, Pa. R. Mt. B. 1-21
Gentlemen:—Kindly send me complete details regarding the many ways whereby I can economize by using Boronic Alloying Metals.

MY HOME ADDRESS IS:

Name _____
City _____
State _____

☐ Our literature mailed to employer and employee who aim for IMPROVED PRODUCTS



Our Price List (with changes found necessary from time to time) may be found filed at the SERVICE STATIONS of The Reuben H. Donnelley Corporation, Publishers of the DONNELLEY'S RED BOOK—in the leading cities.

Solid Manganese Frogs and Crossings

INDIANAPOLIS SWITCH & FROG CO. : : : Springfield, Ohio

We are Licensed to Manufacture Balkwill Articulated Manganese Crossings

ESTABLISHED 1882

THE WEIR FROG CO.

Track Work of Rail and
Manganese Steel Construction

Manufacturers of Balkwill Articulated Cast Manganese Crossings

CINCINNATI

-

-

-

OHIO

ST. LOUIS FROG AND SWITCH CO.

TRACK WORK OF QUALITY



Manufacturers of Balkwill Articulated Cast Manganese Crossings

We are pleased to send our 280-page Catalogue on request.

Address Dept. M, St. Louis, Mo.

KILBY FROG and SWITCH CO.

BIRMINGHAM, ALABAMA

MANUFACTURERS OF

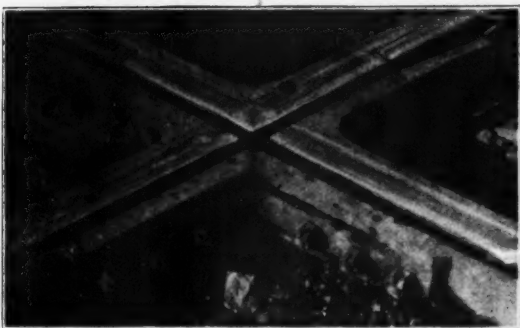
RAILROAD CROSSINGS, FROGS, SWITCHES, ETC.

OF MANGANESE OR ALL-RAIL CONSTRUCTION

We are licensees for the manufacture of Balkwill Articulated Manganese Crossings



Two Balkwill Articulated Cast Manganese Crossings
Installed by New York, New Haven & Hartford R. R.



A corner in one of the Heavy Duty Type Crossings shown above

Several hundred **Articulated Cast Manganese Crossings** of various types have been sold to the following Railroads:

Atchison, Topeka & Santa Fe R. R. (Santa Fe)	Houston Belt & Terminal Company
Baltimore & Ohio R. R.	Illinois Central Railroad
Baltimore & Ohio Chicago Terminal R. R.	Louisville & Nashville R. R.
Big Four R. R.	Minneapolis, St. Paul & Sault Ste. Marie (Soo Line)
Butte, Anaconda & Pacific R. R.	Missouri Pacific Railroad
Central California Traction R. R.	New York Central Lines
Chesapeake & Ohio R. R.	New York, Chicago & St. Louis R. R. (Nickel Plate)
Chicago & Alton R. R. (Alton)	New York, New Haven & Hartford R. R.
Chicago, Burlington & Quincy R. R. (Burlington)	Northwestern Pacific R. R.
Chicago & Eastern Illinois Ry.	Pacific Electric Railway
Chicago, Rock Island & Pacific R. R. (Rock Island)	Pennsylvania Lines
Chicago & Western Indiana R. R. (Chicago Belt)	Peoria & Pekin Union
Elgin, Joliet & Eastern R. R. (Chicago Outer Belt)	Pere Marquette Railroad
El Paso & Southern R. R.	Portland & Southwestern R. R.
Erie Railroad	Richmond, Fredericksburg & Potomac R. R.
Fresno Traction Company	Seaboard Air Line Railroad
Grand Trunk Railway	Southern Railway
Gulf, Colorado & Santa Fe R. R.	Southern Pacific System
Hocking Valley Railroad	Stockton Electric R. R.
	Toledo & Ohio Central R. R.
	Toledo Terminal Railway
	Union Pacific Lines
	Wheeling & Lake Erie R. R.

Send to us for a complimentary set
of detailed specifications

**The Balkwill
Manganese Crossing Co.**

Williamson Building, CLEVELAND, OHIO



Is your section **ONE HOUR** or
15 MINUTES LONG.

On an energy-absorbing, slow-moving handcar, a 5 mile section is **ONE HOUR LONG**—or more.

On a section car driven by a Fairmont Ball Bearing motor, the same section is only **15 MINUTES LONG**.

The miles on any section are made shorter by the use of a Section Motor Car.

The miles are made **SHORT-EST** through the use of **FAIRMONT BALL BEARING** motor cars—because they are dependable, day in and day out, in heat, cold, rain or snow. And the Fairmont Ball Bearing motor lasts years longer without loss of power or efficiency.

**Fairmont Gas Engine
& Railway Motor
Car Compay**

FAIRMONT

MINNESOTA

Odd, Isn't It

—that some people think of advertising as a means of benefiting only the seller, when its basic function *must be* to render a necessary service to the buyer, else it could not exist. Merchandise lives or dies as it does or does not meet a human need. Advertising is subject to the same law of service. The real measure of its value is what it *gives*, not what it gets.

In the light of these truths, the marvelous growth of advertising, in itself, is an impressive demonstration of its essential character in our economic system.

But you are not interested in *all* advertising any more than you are in all merchandise. That is one big reason why you have a highly specialized Business Paper in your field such as the one carrying this advertisement. It was born of your needs, not of any man's desire to be a publisher.

LIST OF MEMBERS

Each has subscribed to and is maintaining the highest standards of practice in their editorial and advertising service.

Advertising and Selling
American Architect
American Blacksmith
American Exporter
American Funeral Director
American Hatter
American Machinist
American Paint Journal
American Paint and Oil Dealer
American Printer
American School Board Journal
Architectural Forum
Architectural Record
Automobile Dealer and Repairer
Automobile Journal
Automotive Industries
Bakers Weekly
Boot and Shoe Recorder
Brick and Clay Record
Building and Building Management
Building Supply News
Bulletin of Pharmacy
Canadian Grocer
Canadian Railway and Marine World
Candy and Ice Cream
Chemical & Metallurgical Engineering
Clothing and Furnishers
Coal Age
Coal Trade Journal
Concrete
Cotton
Daily Iron Trade & Metal Market
Report
Distribution and Warehousing
Domestic Engineering
Dry Goods Economist
Drygoodsman
Dry Goods Reporter
Electric Railway Journal
Electrical Merchandising
Electrical Record
Electrical World
Embalmer's Monthly
Engineering & Contracting
Engineering and Mining Journal
Engineering News-Record
Factory
Farm Implement News
Farm Machinery—Farm Power
Fire and Water Engineering
Foundry (The)
Furniture Journal
Furniture Manufacturer and Artisan
Furniture Merchants' Trade Journal
Gas Age
Gas Record
Grand Rapids Furniture Record
Haberdasher
Hardware Age

How It Works for You

What it does for you and your field editorially is self evident, but its *aditorial* service is just as vital. Instead of a buyer having to depend upon gossip, hearsay and dribbles of information from this or that source, he gets it all between two covers.

Timely, authoritative, comprehensive statements about needed materials pass in review as the advertising pages are turned. Confident judgments can be formed, and intelligent decisions made.

Yet advertising is NOT an *added* expense, but an improved distributive process, which takes the place of slower, more costly and less efficient methods.

That is why it pays to *read* advertising even more than it pays to advertise. Especially if you read it in papers which have met the exacting requirements of membership in The Associated Business Papers, Inc., for one of its standards of practice requires that a paper must *decline any advertisement which has a tendency to mislead or which does not conform to business integrity.*

You are invited to consult us freely about
Business Papers or Business
Paper advertising

LIST OF MEMBERS

(Continued)

Heating and Ventilating Magazine
Hide and Leather
Hospital Management
Hotel Monthly
Illustrated Milliner
Implement and Tractor Age
Implement and Tractor Trade Journal
Industrial Arts Magazine
Inland Printer
Iron Age
Iron Trade Review
Lumber
Lumber Trade Journal
Lumber World Review
Manufacturers' Record
Manufacturing Jeweler
Marine Engineering
Marine Review
Metal Worker, Plumber and
Steam Fitter
Mining and Scientific Press
Millinery Trade Review
Mill Supplies
Modern Hospital
Motor Age
Motorcycle and Bicycle Illustrated
Motor Truck
Motor World
National Builder
National Druggist
National Petroleum News
Nautical Gazette
Northwest Commercial Bulletin
Northwestern Druggist
Nugent's, The Garment Weekly
Oil News
Oil Trade Journal
Power
Power Boating
Power Plant Engineering
Price Current—Grain Reporter
Railway Age
Railway Electrical Engineer
Railway Maintenance Engineer
Railway Mechanical Engineer
Railway Signal Engineer
Retail Lumberman
Rubber Age
Shoe Findings
Shoe and Leather Reporter
Shoe Retailer
Southern Engineer
Southern Hardware and Implement
Journal
Sporting Goods Dealer
Starchroom Laundry Journal
Tea and Coffee Trade Journal
Textile World Journal
Timberman
Welding Engineer
Woodworker

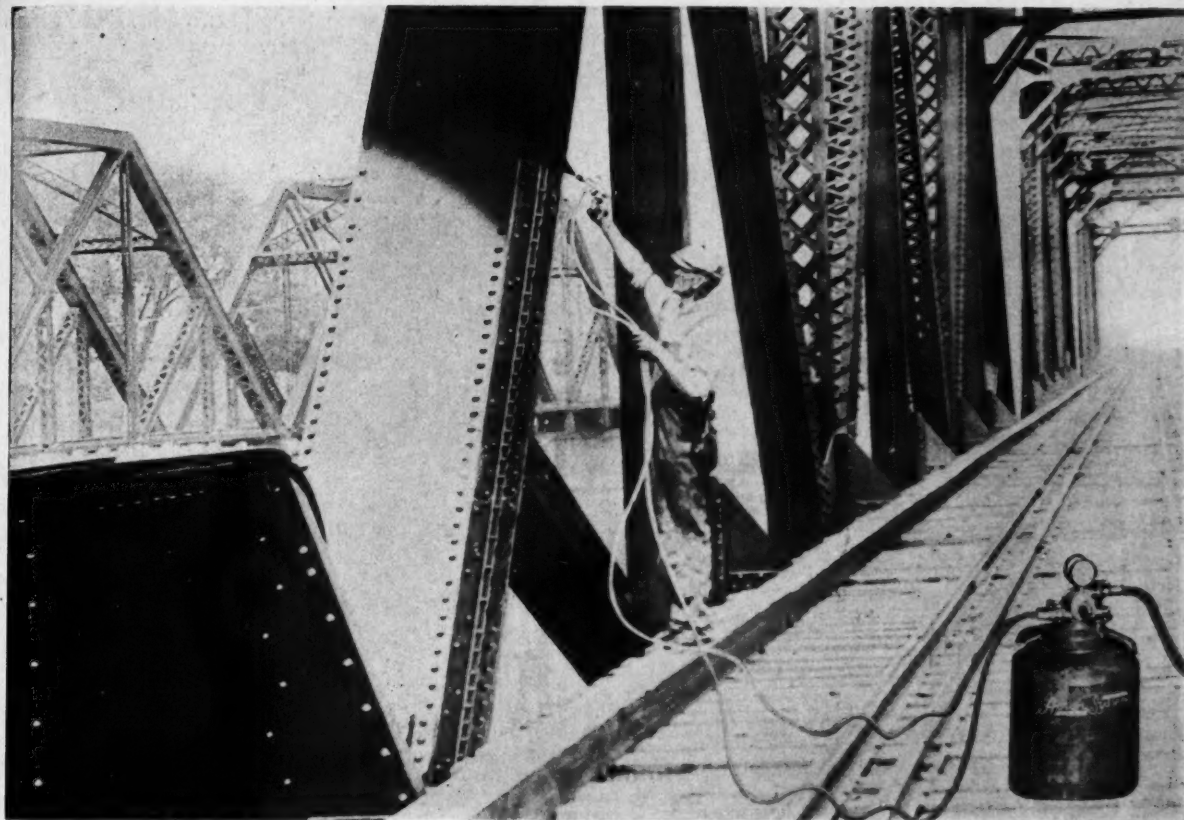
THE ASSOCIATED BUSINESS PAPERS, INC.

JESSE H. NEAL, EXECUTIVE SECRETARY

HEADQUARTERS:

220 West 42nd Street

NEW YORK CITY



Spray-painted with the Aeron System Portable Painting Equipment
Manufactured by The DeVilbiss Mfg. Co., 3682 Detroit Ave., Toledo, Ohio

Severe Test



Eastern Sales Offices:

*Atlanta
Baltimore
Boston
New York
Philadelphia
Washington*

Western Sales Offices:

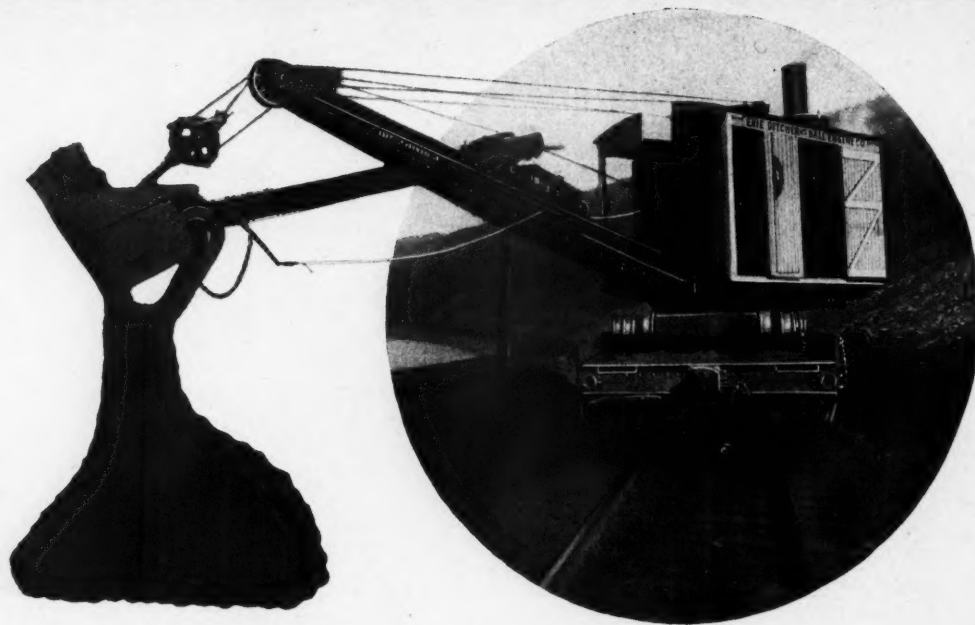
*Chicago
Cleveland
Detroit
Pittsburgh
St. Louis
San Francisco*

Arrow indicates the Mayari Steel Heat Treated Bolt which held securely while the heavy frog arm was bent in derailment.

All Bethlehem Manganese Track Work equipped with this type of Bolt

BETHLEHEM STEEL COMPANY
GENERAL OFFICES: BETHLEHEM, PA.

SOLE EXPORTER OF OUR COMMERCIAL STEEL AND IRON PRODUCTS **CONSTEEL** CONSOLIDATED STEEL CORPORATION 115 BROADWAY, NEW YORK, U.S.A.



“The ERIE Ditcher is far superior to any other ditcher that we have ever used.”—

Division Engineer, Renovo Division of the P. R. R.
And many other officials have told us the same.

(Name on
Request)

RAILROAD OFFICIALS with years of ditching experience have been quick to recognize the improved features of the ERIE Ditcher.

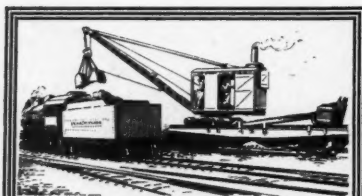
The 10 ERIE Ditchers now owned by the Pennsylvania have won the hearty endorsement of the officials in charge of ditching and excavation work. Other progressive roads, such as the C. B. & Q. R. R., owners of 5 ERIES; Northern Pacific, owners of 4 ERIES; Canadian National, owners of 5 ERIES; L. & N., owners of 5 ERIES—such roads as these have tried one ERIE, and then come back for more.

We would like to send you some photos, cost data—also our 12-page bulletin, showing why these officials prefer the ERIE to any other ditcher they have ever used.

Write for Bulletin T.

BALL ENGINE CO., Erie, Pa., U. S. A.

Builders of ERIE Railway Ditchers and Locomotive Cranes.



The ERIE Ditcher can be easily and quickly changed over to a locomotive Crane. Gives splendid service loading and unloading rails, ties, heavy scrap, bridge members, other heavy timbers, etc.

With clamshell bucket: unloads coal, coals locomotives, or handles gravel, rip-rap, cinders, etc. (Shown in Bulletin T.)

ERIE Railway Ditchers **BALL**
Engine Co.
Erie, Pa.

